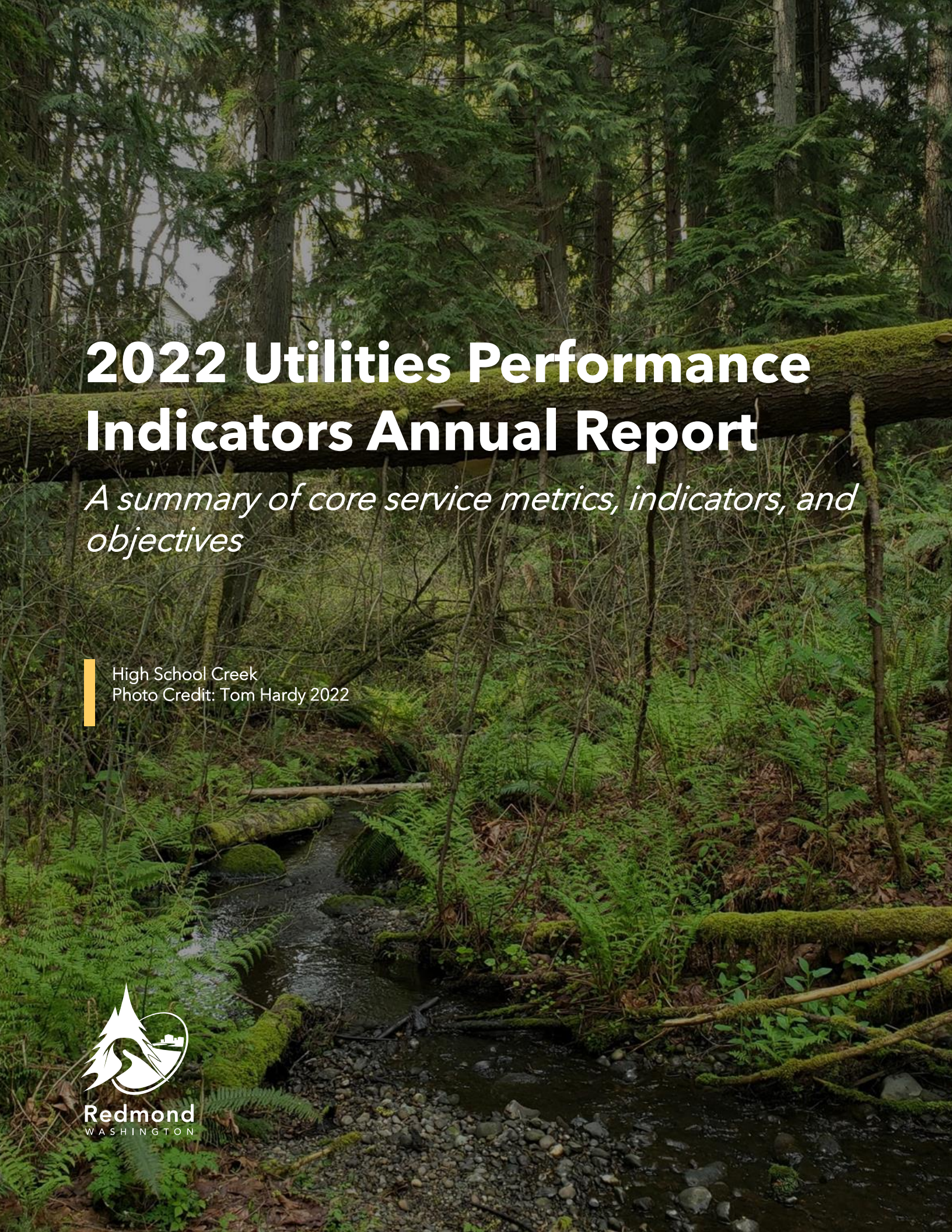

2022 Utilities Performance Indicators Annual Report

A summary of core service metrics, indicators, and objectives

High School Creek
Photo Credit: Tom Hardy 2022

Redmond
WASHINGTON

Department of Public Works

Prepared by:
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I. Overview

Redmond's Public Works Department provides essential services to the people who live, visit, and work in our community. Staff work every day to meet the local, state, and federal regulations that set standards and operational guidelines for: drinking water quality; stormwater runoff management, water quality in our lakes, rivers, and streams; conserving threatened salmon populations; and managing garbage, recycling, yard debris, and food scraps. In all cases, Redmond's Public Works meets our regulatory obligations. Where appropriate, we work to exceed regulatory obligations to protect our natural resources and reduce our carbon footprint.

Public Works relies on data-driven performance measures to monitor the health of our natural resources and track progress towards long-term infrastructure, sustainability, and asset management goals for each of the core service areas: Surface Water and Habitat, Stormwater, Groundwater and Drinking Water, Solid Waste, and Infrastructure Management (Water, Wastewater, and Stormwater). Strategies for reaching goals in core service areas are described in the following strategy documents:

- Utilities Strategic Plan (USP);
- Environmental Sustainability Action Plan (ESAP);
- Community Strategic Plan (CSP); and
- Budgeting by Priorities measures.

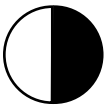
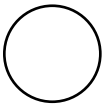
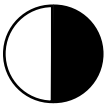
Alignment with strategy documents is indicated for each measure using the following icons:

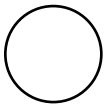
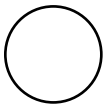
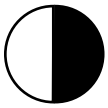
Performance measures for the core environmental and utility services areas have been maintained since 2012. The Science and Data Analytics (SDA) Division tracks and reports on these measures on an annual basis to monitor progress toward goals and support work planning and prioritization. See the Appendix for detailed descriptions of how each measure is tracked and updated. The Executive Summary tables below provide a quick look at overall progress with a status indicator along with insights about the measure.

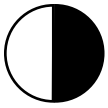
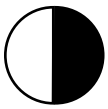
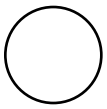
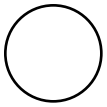
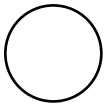
Status

- ● - Trends over the past 5 – 7 years indicate a meeting or exceeding of program target.
- ◑ - Trends over the past 5 – 7 years show improvement, but the program target is not being met.
- ○ - Trends show no change or deterioration in a measure. The program target is not met.

Insights – General comments that focus on the key insights and goals of the metric.

	Performance Measure	Status	Insights
Protect and Enhance Stream and Related Habitat	Surface Water Quality	On Hold	Not available for this release. Data needed to calculate this measure are not currently available, but data collection will resume in 2023. Once results are available, they will be released in a future version of this document.
	Surface Water Biology (B-IBI)		From 2014 to 2022, B-IBI scores have remained stable in a range from 27 – 35, with a possible increase. However, these scores are all well below the overall average target of 60. (Figure 2) Moving locations of B-IBI sampling sites to match locations selected for the Surface Water Quality program will ensure the alignment of these two monitoring programs and help detect relationships.
	Runoff Treatment		The yearly target of 50 acres a year was not met in 2022. Runoff treatment has been slowly increasing since 2011. (Figure 4) Review current processes of tracking this measure.
	Stream Buffer Plantings		Redmond has consistently met the goal of two acres of critical stream buffer plantings per year since 2013. In 2022, Redmond planted 2.07 acres, conforming with a stable trend that started in 2015. (Figure 6) Continue the City planting program with a focus on critical areas and associated buffers.
	Tree Canopy	On Hold	The percentage of tree canopy area in Redmond and tree canopy area within critical area stream buffers has remained relatively stable since monitoring began in 2009 and when it was last calculated in 2019. Develop a more reliable leaf-on image acquisition data provider.
	Fish Migration Barriers		In 2022, no fish barriers were removed. Fish barrier removal since 2014 has been sporadic, with the annual goal not being met in three of the years between 2015 and 2022. The long-term trend, however, is ahead of pace to achieve the fish barrier removal goal. (Figure 11) Continue funding fish passage removal projects in the CIP and explore developing a systemic fish barrier removal program.
	In-Stream Habitat Complexity		Short-term in-stream habitat complexity goals were not met in 2022. Since 2017, the amount of enhanced stream length completed exceeded the goal in four out of six years. (Figure 14) Continue to plan and fund instream complexity projects.

	Performance Measure	Status	Insights
Provide Safe Drinking Water and Protect Water Resources	Water System Compliance		The water system has a green operating permit and a history of compliance with all state and federal regulations. The green permit was maintained in 2022, with this status expected to continue. (Figure 17) Support continued compliance by implementing an updated sample stand maintenance schedule.
	Aquifer Quality Compared to Groundwater Quality Standards		In 2022, the percentage of wells meeting groundwater quality standards decreased, resulting in three consecutive years of not meeting the 57% compliance goal. (Figure 18) Continue to proactively monitor PFAS chemicals ahead of future enforceable regulations.
	Aquifer Quality Compared to Drinking Water Standards		In 2022, the percentage of wells meeting drinking water standards decreased. This decrease is counter to the general improving trend that started in 2017. Four monitoring wells exceeded contaminant level standards. (Figure 19) Assess the impact of well water turbidity on higher concentrations of arsenic in testing samples.
	High Risk Sites Visited		100% of all high-risk sites were inspected and provided technical assistance in 2022. Since 2016, 100% of high-risk sites have been inspected, with the exception of 2020, when three sites were missed (9%) due to COVID-19 restrictions. (Figure 20) Continue to provide annual pollution prevention technical assistance at high pollution risk sites.
	High Priority Septic Removal		In 2022, one high-priority septic system was removed during development projects. Since 2016, high-priority septic systems have slowly decreased at an average rate of 1.3 per year. At this current rate, Redmond will not meet the 100% removal goal of high-priority septics by 2050. (Figure 21) Recommendations include developing a CIP program, stricter development requirements, and providing financial incentives

	Performance Measure	Status	Insights
Provide Reliable Utility Services	City Well Production		Although this metric experienced slight changes due to changes in total demand, activity is relatively stable. (Figure 22) During peak-season demands (June 1 - September 30), city well production year over year is relatively stable. (Figure 23) Continue to pursue Temporary Construction Dewatering Policy.
	Water Main Breaks		In 2022, there was one water main break, the smallest number of breaks since 2017. (Figure 24) Continue with PRV comprehensive maintenance program, which helps reduce the risk of water main breaks.
	Wastewater CCTV Inspections - Miles Per Year		The annual goal of 32 miles of pipe inspected per year was not met in 2022, with 30 linear miles of pipe inspected. Meeting this goal has been sporadic since 2016, with a noticeable increase in 2020 and 2021. (Figure 26) Improve program reliability by sending CCTV equipment to the manufacturer for routine maintenance.
	Sanitary Sewer Overflows		In 2022 there were two Redmond-owned sanitary sewer overflows. Since 2015, three of the four years with overflows were in 2020, 2021 and 2022. (Figure 27) Reduce the risk of overflows by requiring contractors to tie off all sewer pipe plugs outside of maintenance hole structures.
	Runoff Flow Control		The area with runoff flow control in 2022 did not increase. Runoff flow control has been slowly increasing since 2011. (Figure 28) Review current processes of tracking this measure.
	Stormwater CB Inspections		The Stormwater Required CB Inspection program has been consistently meeting the NPDES Permit requirement of inspecting all city-owned catch basins every two years. (Figure 30) Continue to fully inspect 100% of City-owned catch basins every two years.
	Solid Waste Qalert Responses		Over the past five years, the solid waste team has been meeting the goal of taking action on Solid Waste QAlert queries and requests within 48 hours, above 80% of the time. We did not meet this goal in 2022 when the percentage went down to 76%. (Figure 31) Recommend setting a baseline goal for this metric and monitoring performance.
	Waste Management Customer Responses		The Waste Management Service Delivery contract commits WM to meeting certain targets of availability by phone. Self-reported metrics from WM indicate that these targets have been consistently missed over the past few years and are, in fact, steadily getting worse. (Figure 32) Work with WM to increase compliance.

	Performance Measure	Status	Insights
Maximize Waste Reduction and Reuse	Increase Community Waste Diversion	○	In 2022, there was little change in waste diversion in any sector (Commercial, Multifamily, Residential). Since 2011, the diversion rate from residential customers has remained relatively steady, multifamily has increased, and commercial has varied over time. (Figure 34). Progress toward meeting the 2030 target is not being made. Implement the Construction and Demolition Debris program and begin to track tonnage from this new sector.
	Single Family Household Total Waste Stream	●	In 2022, the residential waste stream remained below the goal of 56 lbs/week/household at 52.9. The lowest reported number recorded. Since 2018, there has been a decreasing trend from 58.9 to 54.3 lbs/week/household. However, since 2011, this metric has fluctuated above and below the goal. (Figure 36) Continue to provide waste reduction outreach to the community.
	Commercial Waste Stream	●	In 2021, there was an increase from 334 lbs/ employee to 359, well below the goal of 420. The 2020 results were the lowest results seen since 2010. The 2021 results are the second lowest. There has been a decreasing trend from 454 to 359 lbs/employee. (Figure 37) Continue existing efforts in commercial outreach and technical assistance programs.
	Commercial Organics Waste Stream	●	This metric has been relatively stable since 2018. (Figure 38) However, a slight decrease in waste stream tons occurred in 2020, most likely due to the pandemic. Many businesses either closed or operated below capacity, affecting the tonnage numbers. The addition of multifamily properties in 2021 and 2022 translated to a total tonnage increase from 2020. The overall health of this metric during the pandemic has remained stable. Continue adding accounts to the program. State mandates effective 2026 will drive tonnage higher.

Figure 1: Executive Summary Key Performance Indicators

II. Protect and Enhance Streams and Related Habitat

Surface water quality and habitat protection/enhancement is widely recognized as a significant indicator of a community's overall environmental health. City objectives for Redmond's surface waters (lakes, rivers, and streams) and habitat include safe for human contact, healthy for fish and wildlife, regulatory compliant, and aesthetically pleasing.

Surface Water Quality Index (WQI) – 2022 results are unavailable

0000004, 0000146, 0000147

Description

Methods are currently being revised.

Recommendation

Implement Stormwater Monitoring Program beginning in Fall of 2023 to collect monthly water quality data. Use these data to calculate the WQI measure beginning in 2025.

Discussion

This measure has been identified as valuable for understanding the health of Redmond surface water bodies. Currently, data to inform this measure are not being collected. City staff will ramp up a City-led Stormwater Water Monitoring Program in late 2023. The first report out of this measure is anticipated in 2025

Surface Water Biology (B-IBI)

Description

The City's Watershed Management Plan aims to improve environmental conditions in Redmond's streams over the next 100 years. This plan divides Redmond into 20 watersheds, characterizes conditions in each, and places them into four management strategy categories (Protection, Highest Restoration, Restoration, and Restoration Development). The Benthic index of biotic integrity (B-IBI) is a key indicator to determine the effectiveness of Redmond's watershed-related restoration activities.

Benthic life is a good indication of instream water conditions. The types, quantities, and diversity of small stream bugs provide information on streamflow conditions, water quality, habitat, temperature, and related conditions. The City of Redmond samples 12 streams each year to assess surface water biology conditions throughout the City.

B-IBI measures long-term trends in stream health. Annual variations are more a factor of short-term conditions, such as weather patterns, at a given time rather than overall stream health.

Recommendation

Align B-IBI sampling sites with water quality and flow monitoring sites to better detect relationships among these parameters.

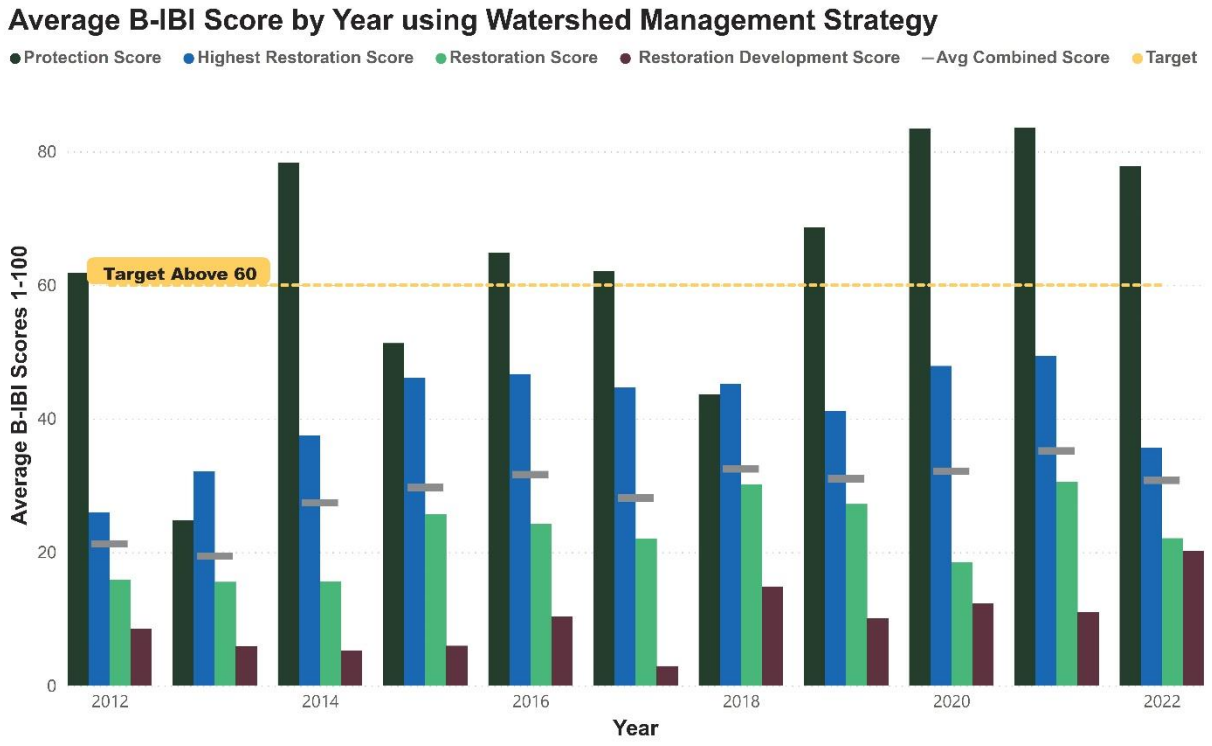


FIGURE 2: OVERALL AVERAGE B-IBI CORE SITE SCORES CURRENT YEAR 2022

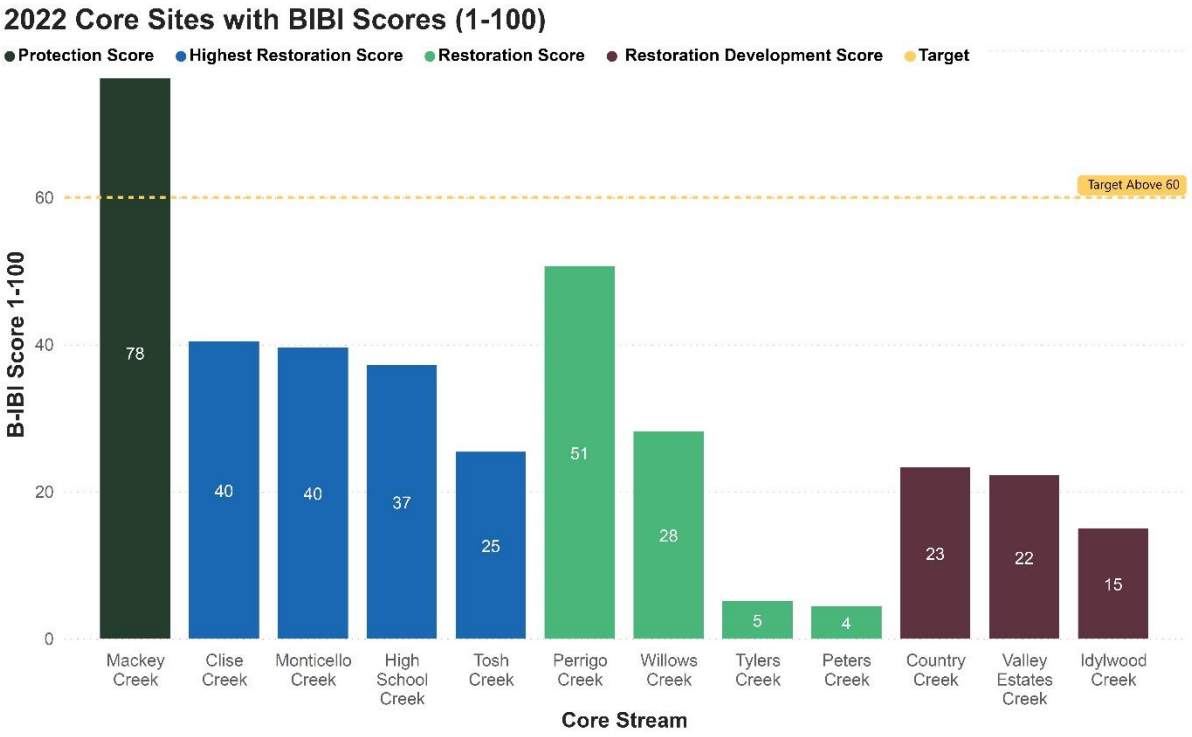


FIGURE 3: BENTHIC INDEX OF BIOTIC INTEGRITY (B-IBI) SCORE FOR REDMOND BY CURRENT YEAR 2022

NB: Protection Watersheds are those with streams that are least impacted by development and have the most intact ecological systems. Conservation and protection are the primary management strategies used in these areas to maintain stream health.

The Highest Restoration Watersheds contain streams that have been impacted by land use and development but nonetheless have a high potential to achieve significantly improved "stream health" in response to restorative management actions.

Restoration Watersheds are areas with streams that are more impacted than "Highest Restoration" streams but still have the potential to achieve improved "stream health" with more substantial restorative management.

Restoration-Development Watersheds have been heavily impacted by development and have streams with some, albeit limited, potential for restoration.

Discussion

B-IBI scores are displayed by Watershed Management Strategy categories in Figures 3 and 4. The City is currently focusing actions in watersheds in the "Highest Restoration" category. From 2014 to 2022, overall averaged B-IBI scores remained stable in a range from 27 – 35, with a possible slight increase. However, these scores are all well below the target of 60 (Figure 3). Protection Watersheds scored an average of 60 or above in most years and exceeded the target of 60 in 2022. The remaining watershed management categories consistently score below the target of 60, with the Highest Restoration category scoring the highest.

All 12 core sampling sites with the current year 2022 B-IBI scores are displayed by Watershed Management strategy categories in Figure 4. Mackey Creek, a Protection watershed, scored 78, well above the target of 60. The Highest Restoration watersheds showed individual scores in the range of 25-40. The Restoration watersheds showed more variability ranging from a score of 4 to 51 with an

average score of 22. The Restoration Development watersheds had a similar average score (21) but within a tighter range from 15-23.

The location of some core sites may change in 2024 to align with the surface water monitoring program, which is currently under development. Perrigo Creek's sampling site will likely be moved further downstream. This change may result in lower B-IBI scores due to differences in the land use within basins upstream of the sampling sites.

Detailed B-IBI results are available by map or table on the Puget Sound Stream Benthos website.

Runoff Treatment

Description

Stormwater runoff from parking areas and streets carries sediment, oils, metals, and other harmful pollution to our surface and groundwater. Treating stormwater runoff can significantly reduce the amount of pollution reaching our waterways. Redmond treats stormwater runoff as sites redevelop or are retrofitted using a variety of facilities that hold, filter, or treat the runoff. These facilities range from small Best Management Practices (BMPs) treating less than an acre to large regional facilities that treat entire basins in Redmond. Redmond has set a long-term ESAP goal of treating 7,463 acres of stormwater drainage area by 2050.

Recommendation

There are two key recommendations that should be considered for this performance measure.

1. Evaluate accuracy of the GIS layer ability to estimate treatment areas, revise as necessary.
2. Determine capital investment needed to meet long-term treatment goal and build into the Stormwater Comprehensive Plan.

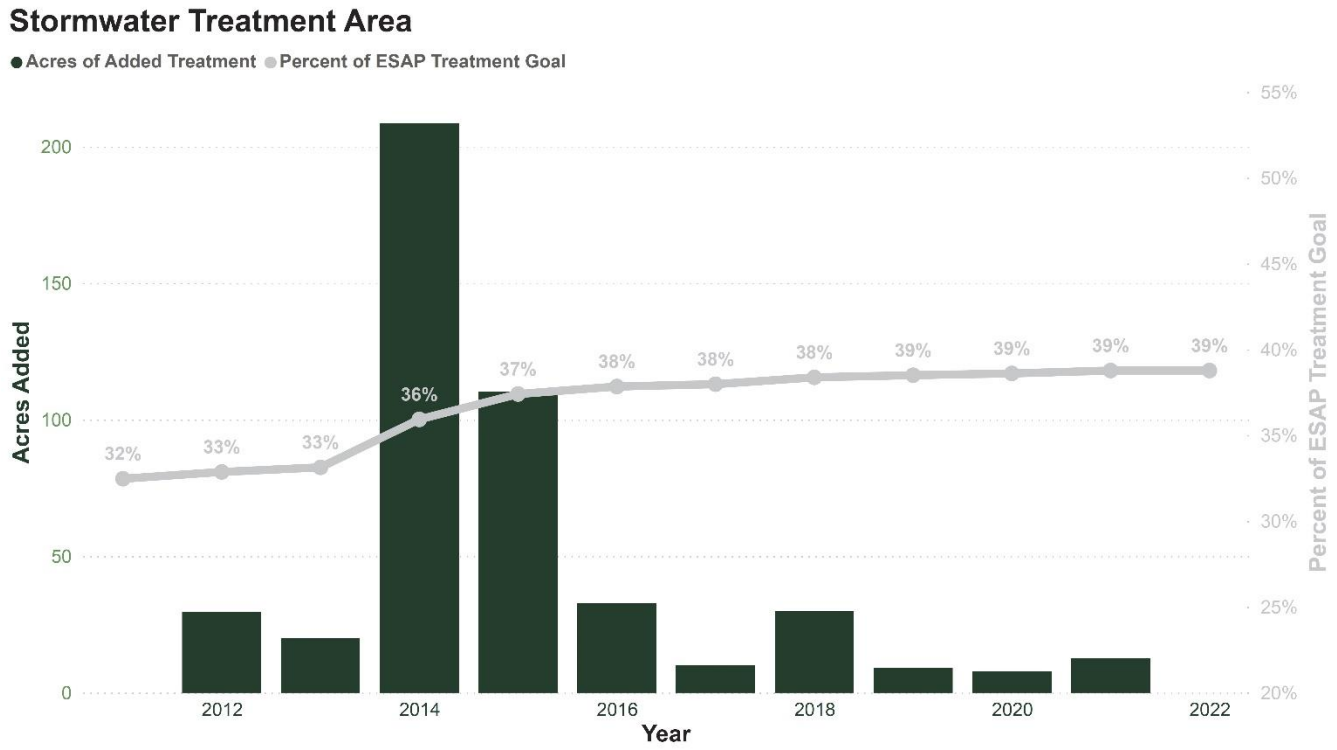


FIGURE 4: ACRES OF RUNOFF TREATMENT

Discussion

No acres of water quality treatment were added in 2022, according to current GIS records. Over the last ten years, roughly 20 acres per year of water quality treatment were added each year. To meet the ESAP goal of treating 7,463 acres by 2050, the City will need to increase that average to 170 acres per year for the next 27 years.

Stream Buffer Plantings

Description

The City performs stream buffer planting to enhance the environmental function and aesthetics of streams. Buffer plants provide shade, bank stability, downed wood, leaf litter (supporting aquatic insects), and other vital habitat functions. As they mature (5-7 years), these plants could also contribute to Redmond's overall tree canopy.

Recommendation

Continue planting with a focus on critical areas and buffers.

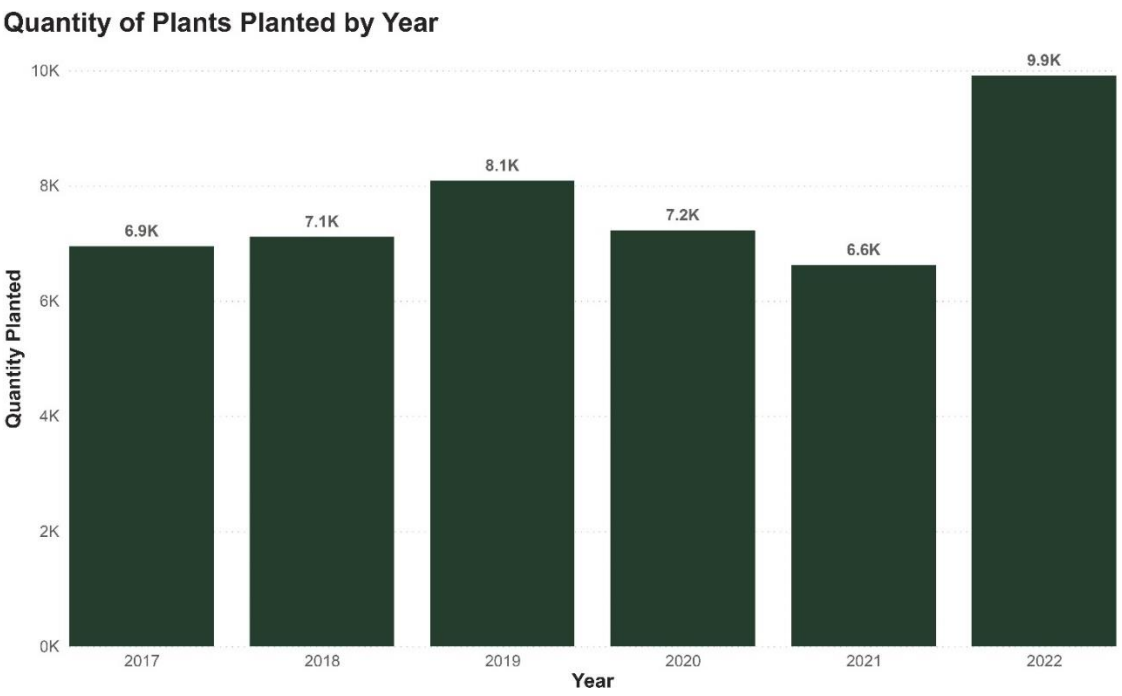


FIGURE 5: TOTAL NUMBER OF PLANTS PLANTED BY REDMOND PER YEAR. [1,3]

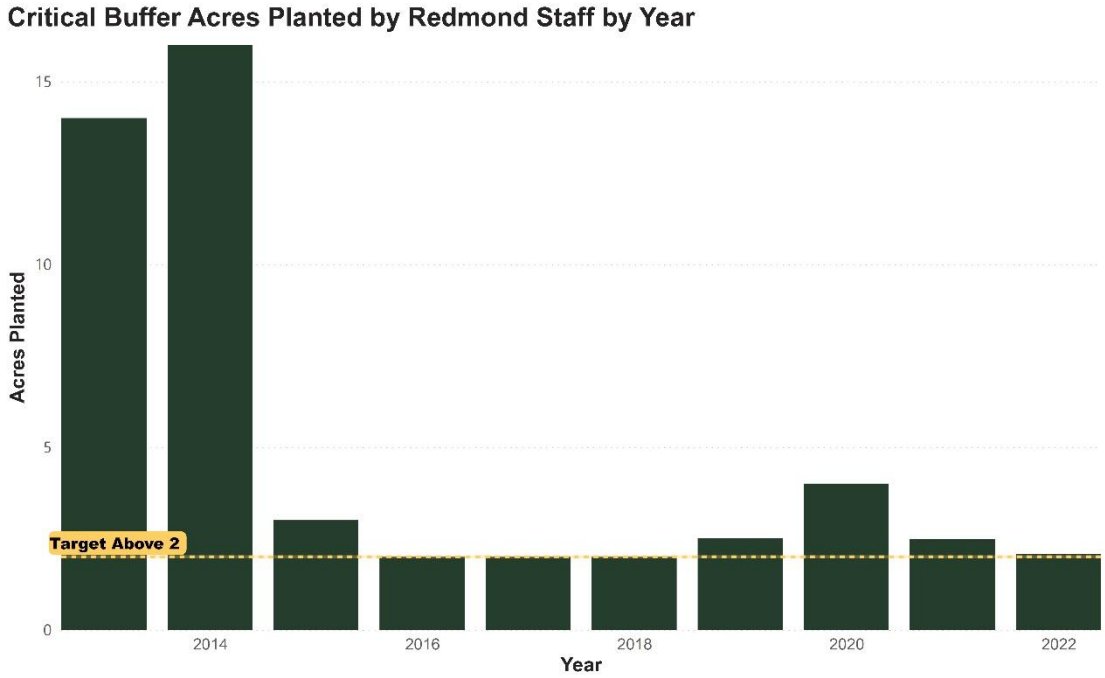


FIGURE 6: ACRES OF NATIVE PLANTS PLANTED BY REDMOND BY YEAR. [2,3]

[1] Estimate - used code-compliant plant spacing for full planting and half that amount for infill.

[2] Planting sites include previously bare ground, invasive coverage, or forest where invasive control occurred for public and private projects. This summary does not include supplemental or replacement planting on previous restoration sites.

[3] Graphs do not include the additional planting of 75 acres by a private contractor in 2021.

Discussion

The following Redmond 2022 projects contributed to the near-term target of two acres per year of new native plantings (Figure 6, planting counts are displayed in Figure 5):

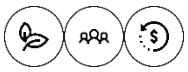
Site	Watershed	Planting Area - Acres
Monjazeb	Monticello	0.60
Fairwinds NGPE	Bear	0.05
Lower Bear Creek	Bear	0.11
Ray Meadows NGPE	Monticello	0.62
Keller	Bear	0.46
NE 95th Street	Bear	0.23
173rd Ave NE	Idylwood	0.05
TOTAL		2.12

Several acres of supplemental planting at existing sites are not counted towards our canopy goal, including at Valley Estates Creek, Upper Tyler's Creek, and Mackey Creek. Green Redmond also planted several sites, including Juel Park, Bear Creek Park, and Farrel-McWhirter Park. The Keller Wetland Mitigation Bank planted 5,000 replacement and supplemental trees on 75 acres of City-owned property, including stream, wetlands, and floodplain habitat, in the fall of 2022. This planting was privately funded.

The near-term goal of planting two acres of buffer area is expected to be met in 2023 due to the ongoing buffer planting in the Monticello and Bear Creek watersheds. Ongoing private development, Green Redmond, and volunteer events will also contribute to the planting of riparian areas. Redmond is partnering with EarthCorps to host three volunteer planting events in 2023-24.

Native planting targets are expected to increase to five acres per year in the future to meet the long-term goal of planting 500 acres in critical area buffers over a 100-year timeframe.

Tree Canopy

 0000009

Description

Canopy-producing plants provide bank stability, downed wood, leaf litter (supporting aquatic insects), lower instream temperatures, and other vital habitat functions. In addition to habitat and ecosystem benefits, tree canopy shade provides a higher standard of living for Redmond residents. This section looks at the overall tree canopy within the City of Redmond limits and especially within natural stream critical area buffers. Stream buffers are targeted for tree canopy improvement, as canopy along streams promotes both aquatic ecosystem restoration and shade for recreational activities. Redmond's Tree Canopy Strategic Plan document has set a goal of 40% tree canopy coverage in Redmond City limits by 2050. Public Works has set a further goal of 90% tree canopy coverage in stream buffers by 2050 (Figure 8).

Recommendation

Develop a cross-departmental service enhancement request for leaf-on aerial imagery to eliminate delays from other agencies and provide consistency in imagery quality.

Continue stream buffer planting to support increased tree canopy growth.

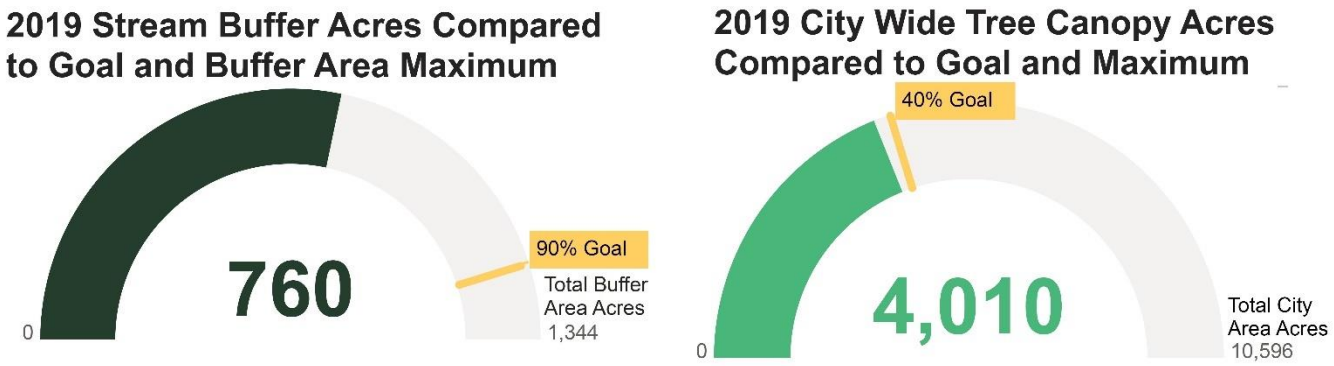


FIGURE 7: TREE CANOPY GOALS [1]

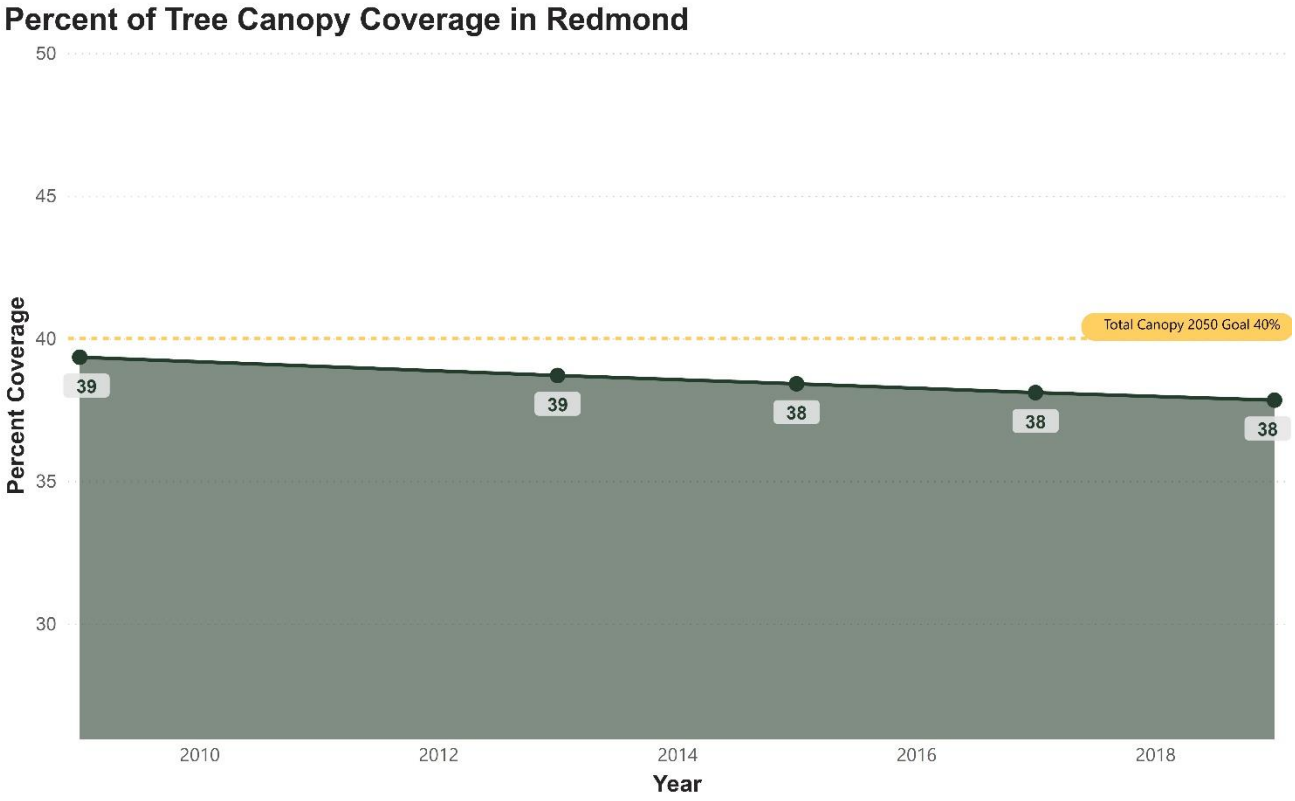


FIGURE 8: TREE CANOPY ACREAGE IN THE CITY OF REDMOND[1]

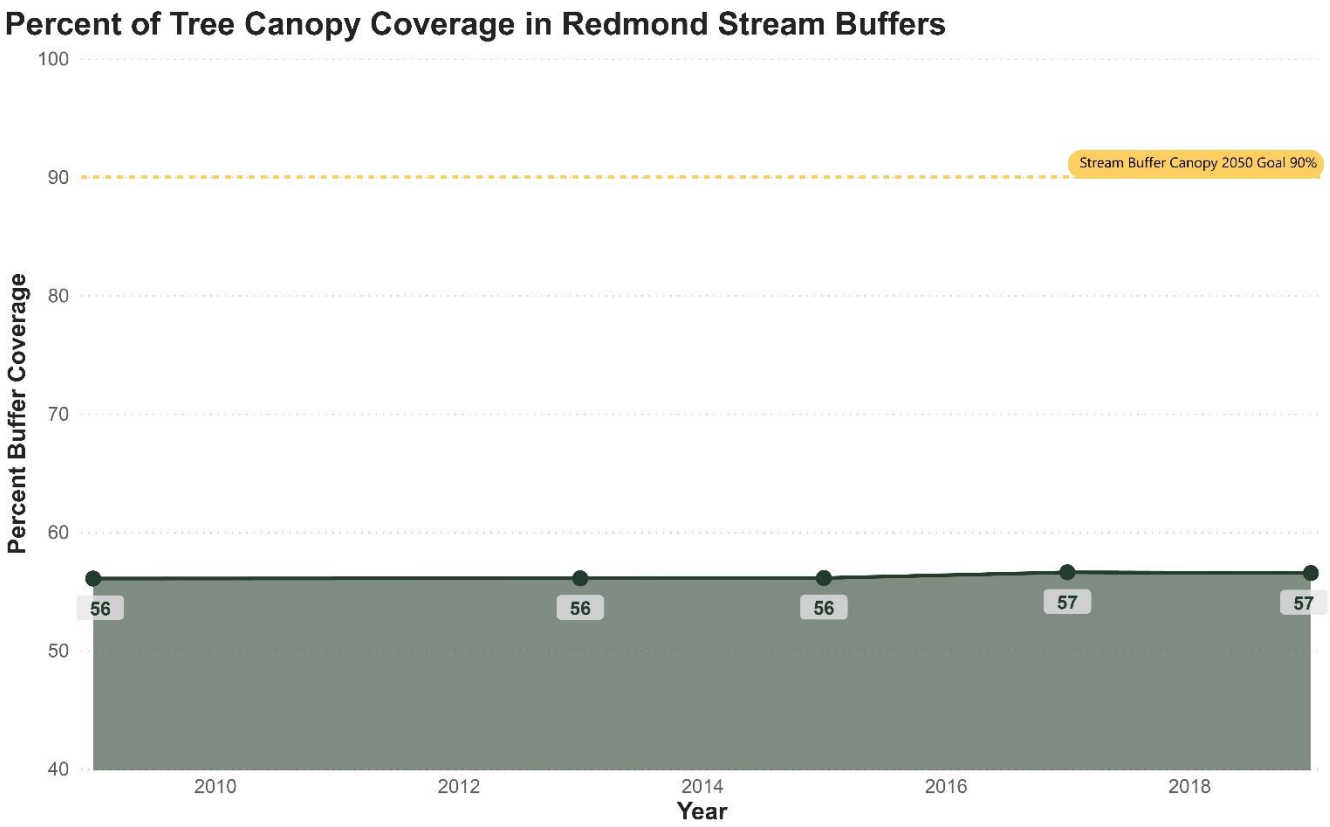


FIGURE 9: TREE CANOPY ACREAGE IN THE CITY OF REDMOND REGULATORY STREAM BUFFERS[1]

[1] All results are based on City limits, including the Redmond Watershed Preserve, and excludes Lake Sammamish acreage within City limits.

Discussion

The percentage of tree canopy area in Redmond and tree canopy area within critical area stream buffers has remained relatively stable since monitoring began in 2009. Overall tree canopy coverage in Redmond has seen a slight yet steady decrease from 39% in 2009 to 38% in 2019 (Figure 9). Tree canopy coverage within critical area stream buffers has held steady at 56%, with a very small increase from 56% in 2009 to 56.5% in 2019 (Figure 10). While tree canopy numbers are not increasing greatly, it is important to note that they have not been dropping at a high rate either, even in the face of ongoing development and increasing impervious surfaces. Also of note, new plantings are usually tall enough to contribute toward canopy five to seven years after they are planted, depending on ground conditions.

It is anticipated that higher future balances in the "in-lieu fee tree fund" can be used to increase the annual critical buffer plantings.

Fish Migration Barriers and Accessible Stream Length

Description

Removing barriers to fish migration is critical to local and regional salmon recovery efforts. A 2010 analysis determined that less than 20% of potentially fish-bearing streams in Redmond were fully accessible to fish.

By 2050, the City of Redmond's goal is to remove all fish barriers on Class 2 streams to allow for the natural migration of fish and support the safe passage of small animals. Meeting this goal will require the removal of at least one barrier per year.

Recommendation

Create a fish barrier removal program to systematically plan for and implement fish barrier removal projects. Incorporate program into Stormwater Comprehensive Plan (development beginning Fall 2023).

Use fish barrier removal program to inform CIP and continue funding fish passage removal projects in the CIP.

Continue leveraging grant funding to expedite fish barrier removal projects.

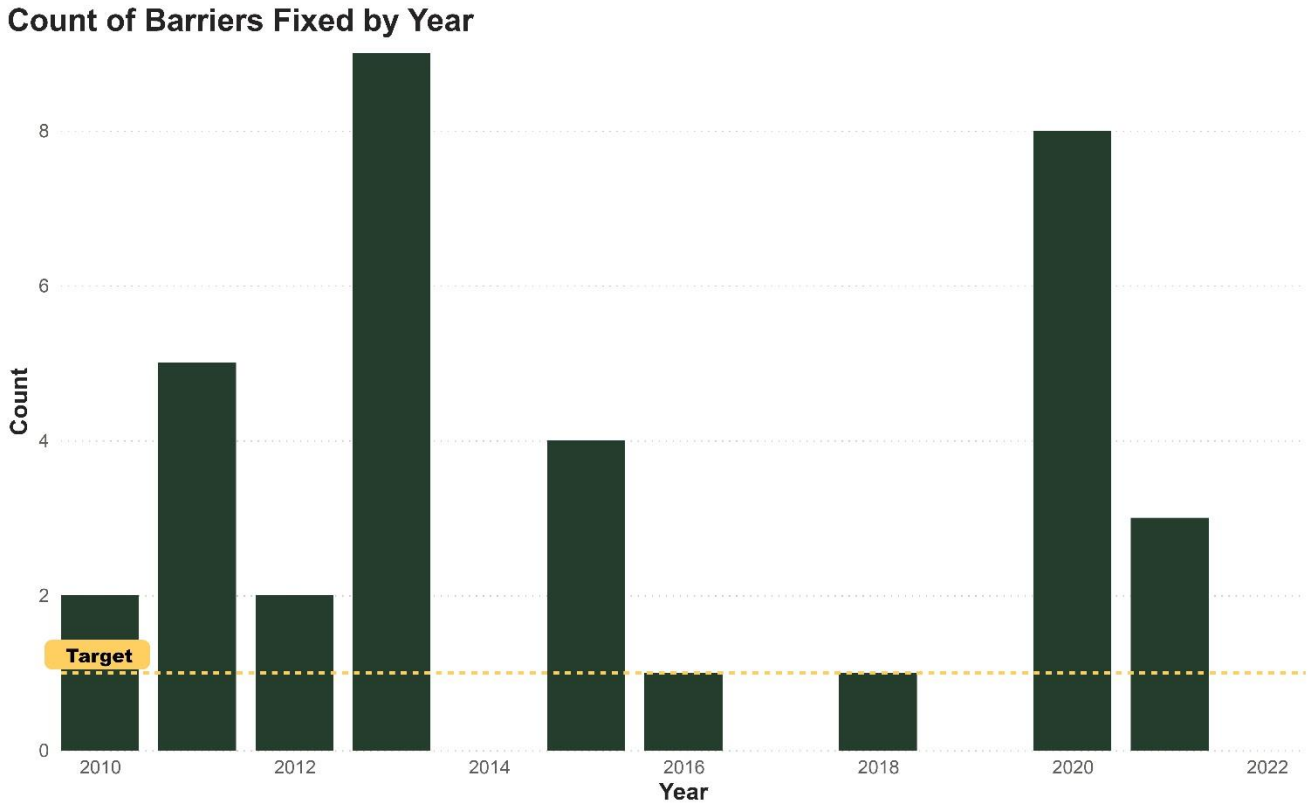


FIGURE 10: FISH MIGRATION BARRIERS REMOVED

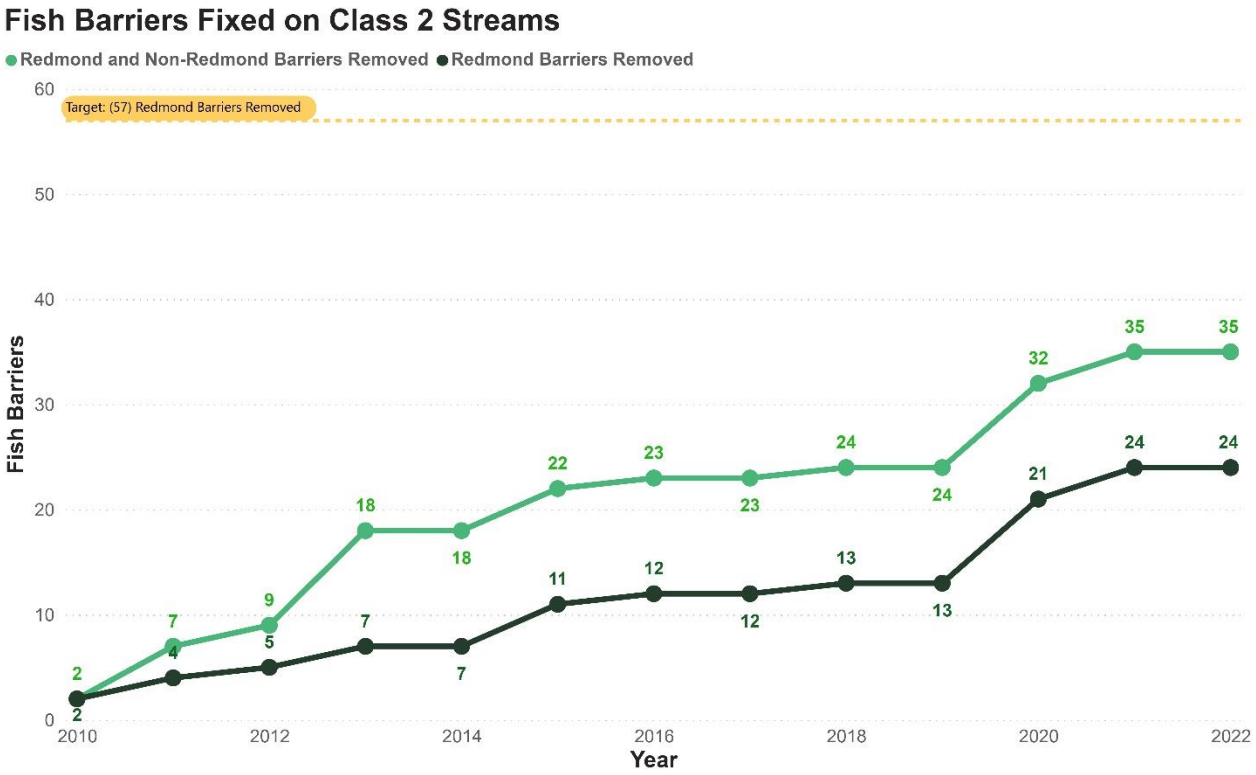


FIGURE 11: FIXED BARRIERS BY YEAR[2]

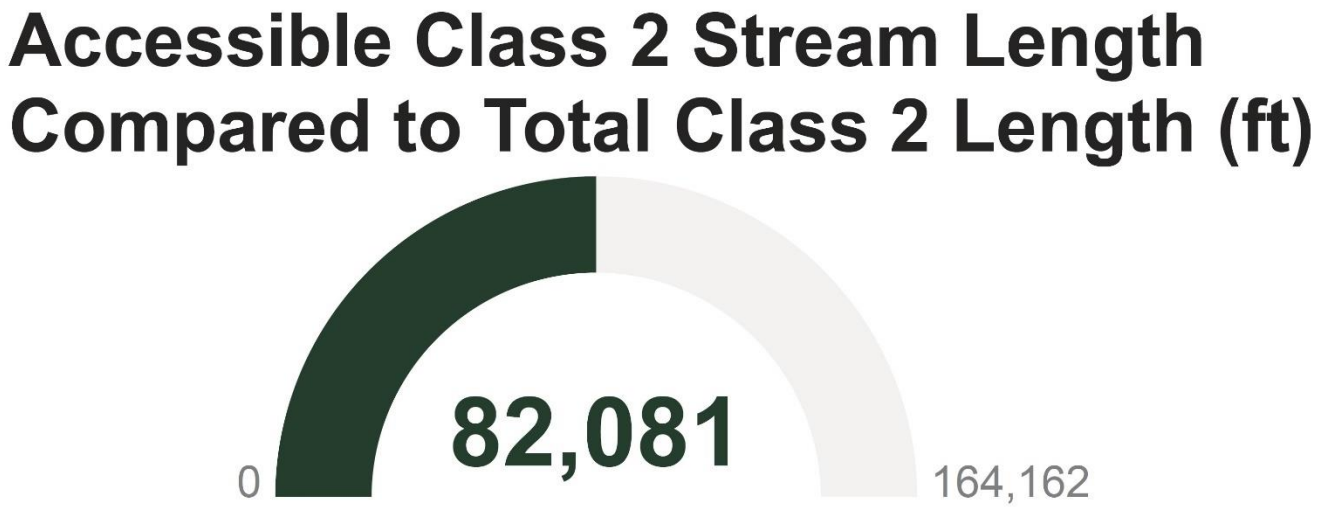


FIGURE 12: ACCESSIBLE CLASS 2 STREAM LENGTHS COMPARED TO TOTAL CLASS 2 STREAM LENGTH [1]

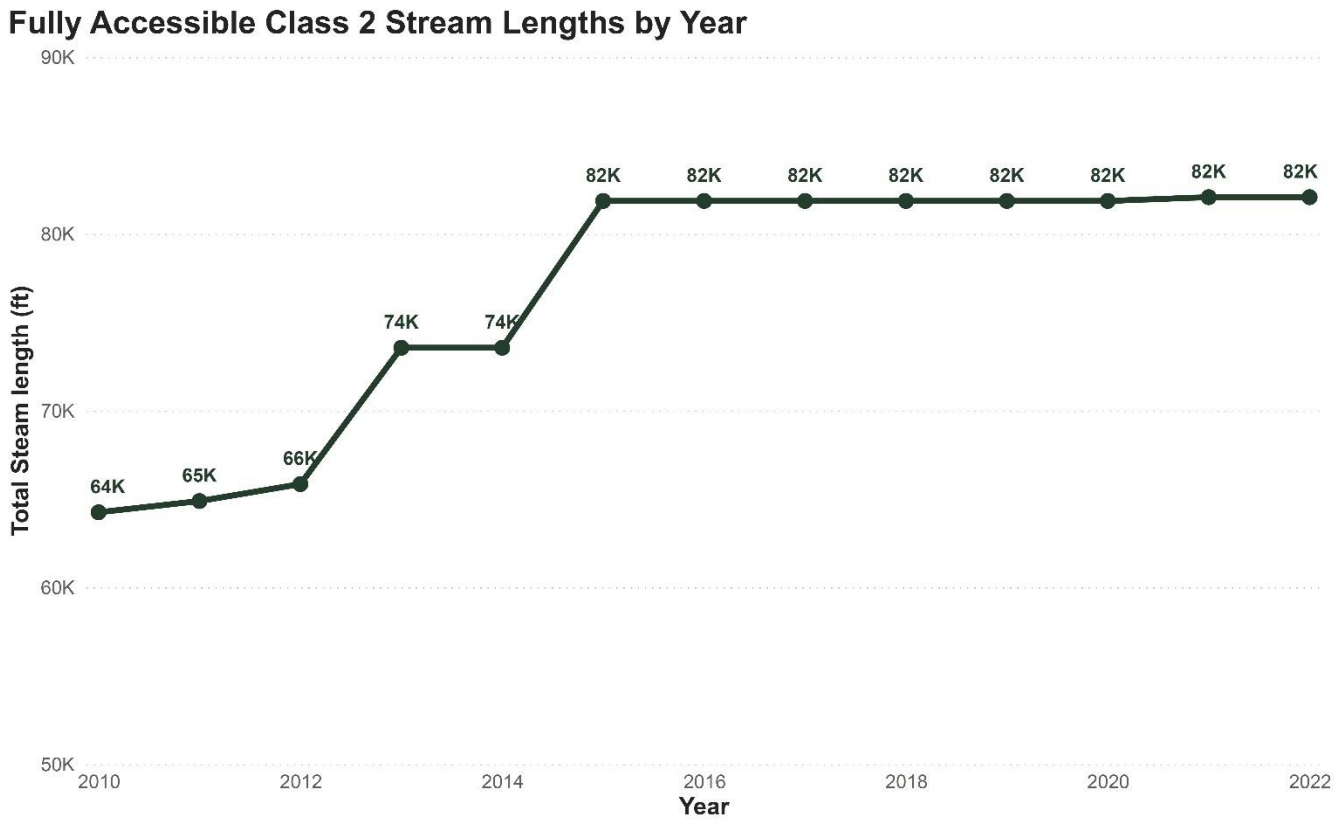


FIGURE 13: FULLY ACCESSIBLE CLASS 2 STREAM LENGTHS BY YEAR[1]

[1] Stream length is based on 2015 LiDAR data and includes some creeks outside of City limits
[2] A new comprehensive fish barrier survey conducted in 2016 discovered new barriers

Discussion

No fish barriers were removed during the summer of 2022 (Figure 11, total fish barrier removal since 2010 can be viewed in Figure 12). No City or private projects were funded in 2022.

Fish barrier removal will increase in 2023, with the removal of three barriers that can be fixed through Public Works maintenance actions. The City's goal of removing or retrofitting at least one barrier a year is on pace to meet the 100% barrier removal target by 2050. These targets include removing barriers in City rights-of-way to meet the intent of a federal court injunction issued in 2013 for WSDOT to significantly increase fish barrier removal to meet treaty-based rights of several northwest Washington Tribes.

In-stream Habitat Complexity

Description

Fish and aquatic wildlife require complex in-stream structures, such as large woody debris (LWD) from fallen trees and branches, to provide diverse habitat conditions throughout their life stages. Wood also provides stream channel stability, supports food for insects, initiates resting pools for fish, traps sediment, and provides a host of other beneficial functions.

The City has a goal to elevate in-stream habitat complexity to "good" or "high" in at least 1,600 feet of stream channel each year. This goal was updated from 1,000 feet in 2021 to account for the addition of tracking Bear Creek, Evans Creek, and the Sammamish River lengths (Class 1 Streams).

Recommendation

Continue to plan, fund, and implement in-stream complexity projects to meet our goals.

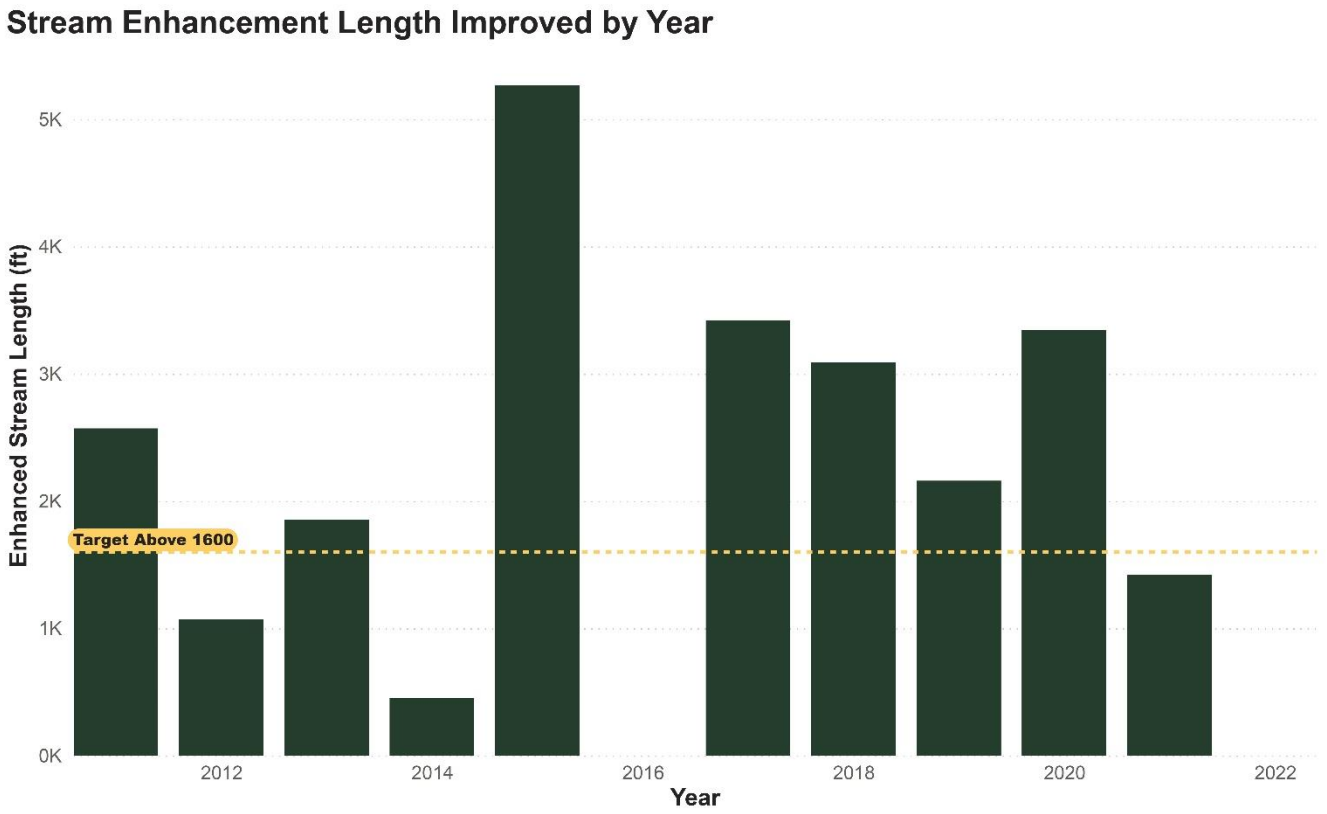


FIGURE 14: IN-STREAM HABITAT COMPLEXITY LENGTH OF ENHANCED STREAMS BY YEAR[1].

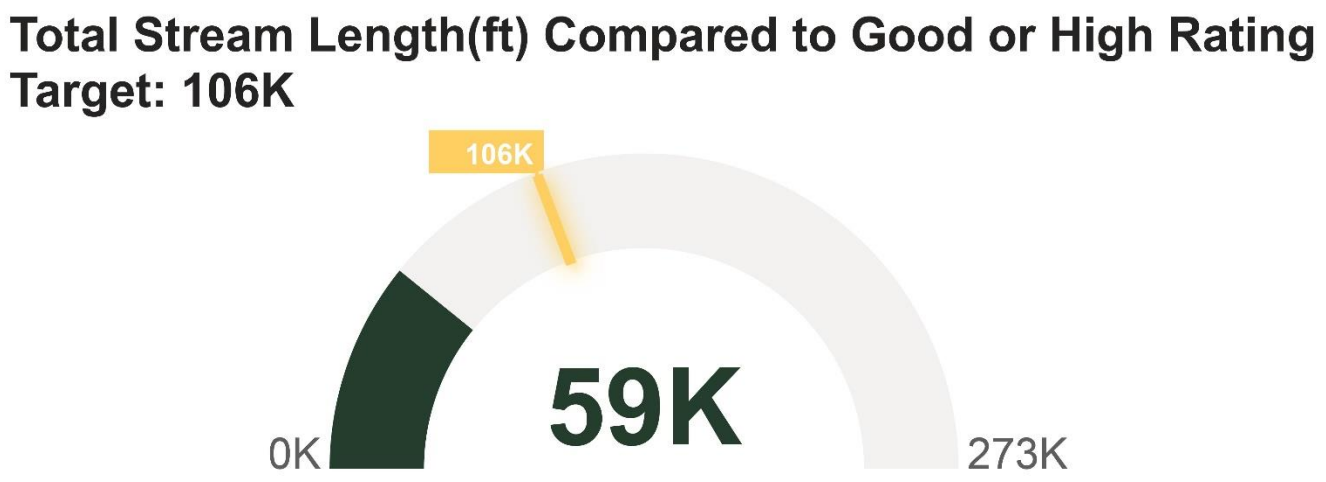


FIGURE 15: IN-STREAM COMPLEXITY GOOD OR HIGH[1]

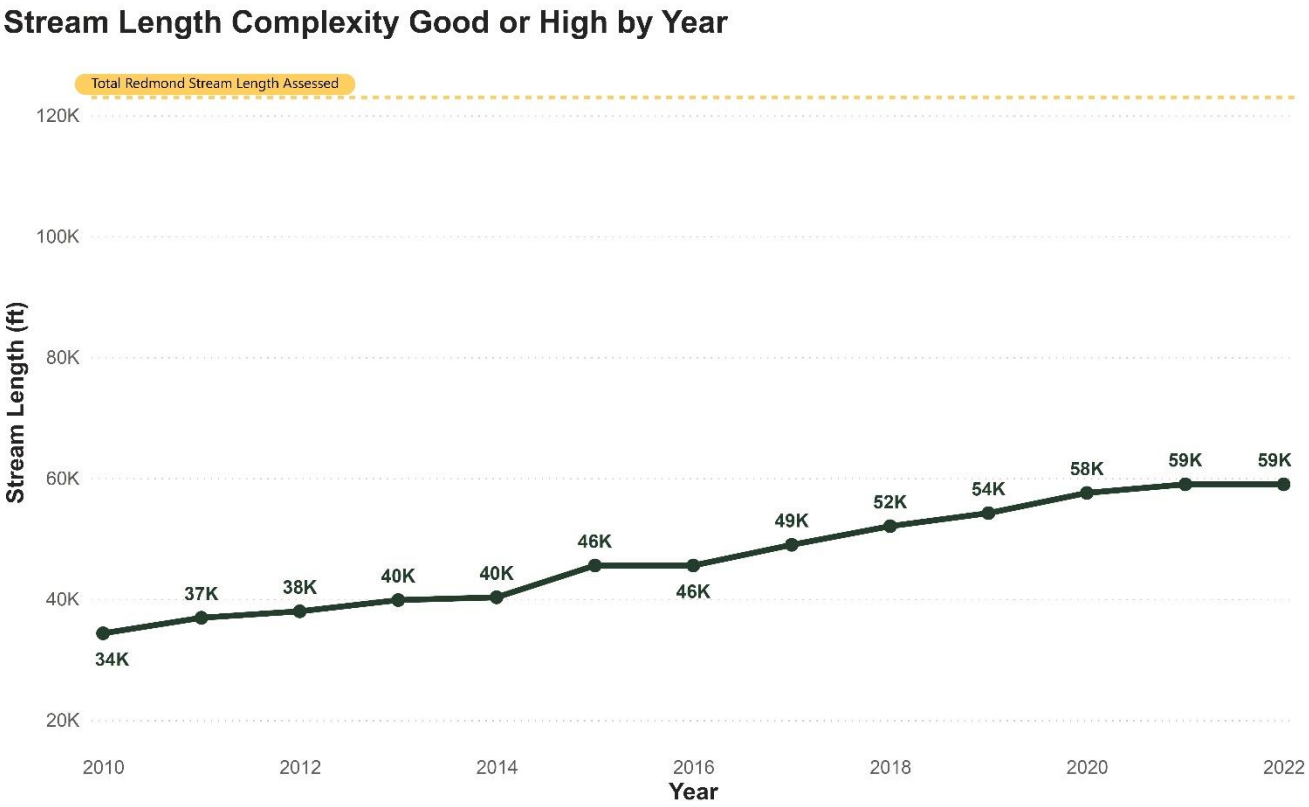


FIGURE 16: IN-STREAM HABITAT COMPLEXITY GOOD OR HIGH BY YEAR[1]

[1] Only includes stream segments that have been walked (assessed) and documented as good or high complexity

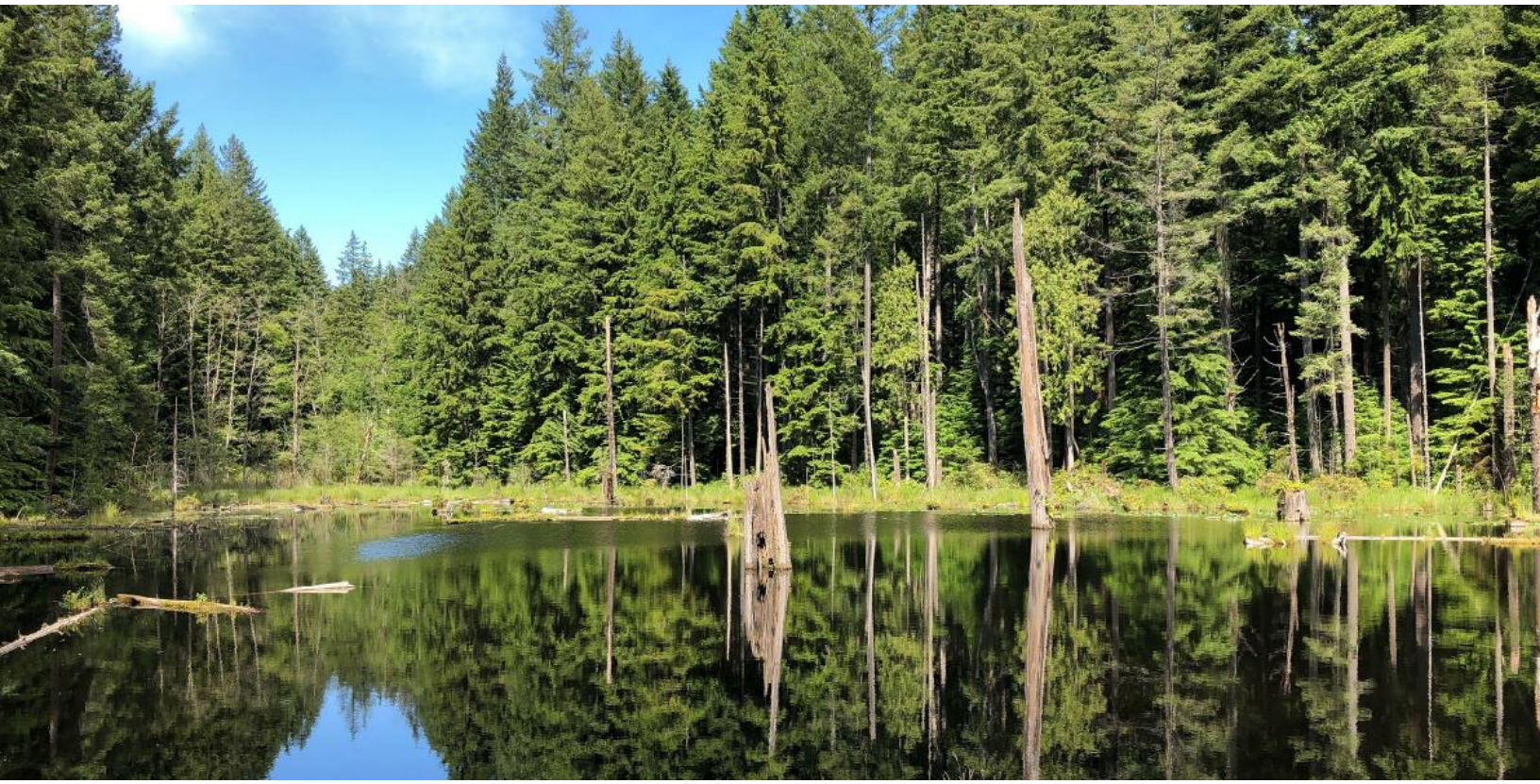
Discussion

Short-term in-stream habitat complexity goals were not met in 2022 in part due to a lack of project funding. The City's Washington Conservation Corps crew adjusted and relocated wood in the Keller reach of Bear Creek, but new wood was not added as part of the work.

One large-scale, complex project will occur in 2023 at the Avondale Road – Bear Creek project. This project will include approximately 500 feet of highly complex channel enhancements. There will also be some minor LWD placement in Monticello Creek this year. In 2024, the Evans Creek relocation project will include 3,500-ft of new highly complex channel.

In 2021, Staff expanded the in-stream complexity measure to include Bear Creek, Evans Creek, and the Sammamish River. Bear and Evans Creeks are two of the City's priority restoration watersheds and have natural channel morphologies generally suitable for LWD. These two creeks have received a large investment over time (with other major projects scheduled), which provides significant benefits to in-stream habitat (all would score "highest complexity" by this measure). A correction for 2021 data: Sound Transit installed 500 feet of LWD in Bear Creek as part of the downtown light rail project.

Focusing proposed mitigation (for example, the Monticello Creek watershed retrofit) in priority watersheds identified in the Watershed Management Plan may help direct resources toward meeting these targets.



III. Provide Safe Drinking Water and Protect Water Resources

The Water Utility delivers 35-40% of Redmond's drinking water from groundwater. Neighborhoods east of Lake Sammamish and the Sammamish River (excluding Novelty Hill) are primarily served by groundwater delivered from the City's own drinking water supply. Redmond regularly monitors the quality of water of the City's water resources from monitoring wells and sampling sites around the City. The City proactively protects the City's water supply through development, land use, and construction policies and by inspecting high-risk sites within the Critical Aquifer Recharge Area (CARA).

Water System Compliance

0000003, 0000146

Description

It is imperative to remain compliant with federal (Environmental Protection Agency) and state (Washington State Department of Health (DOH)) requirements to maintain our water operations permit and, most importantly, to provide clean and safe drinking water to the community. This metric supports Strategy 10 of the Utilities Strategic Plan (USP).

Recommendation

Continue to conduct regular investigative disinfectant residual monitoring in the field. Provide cross-training for staff on sampling techniques; update the Total Coliform Monitoring Plan including preparation of updated sample stand maintenance schedules, flushing program development, and an inspection program for combination air-vacuum valves and blow-off valves to assure ongoing compliance. This will include the Target flushing at dead-ends and low-flow areas on a regulated quarterly frequency to reduce water age and the development of disinfection by-products.

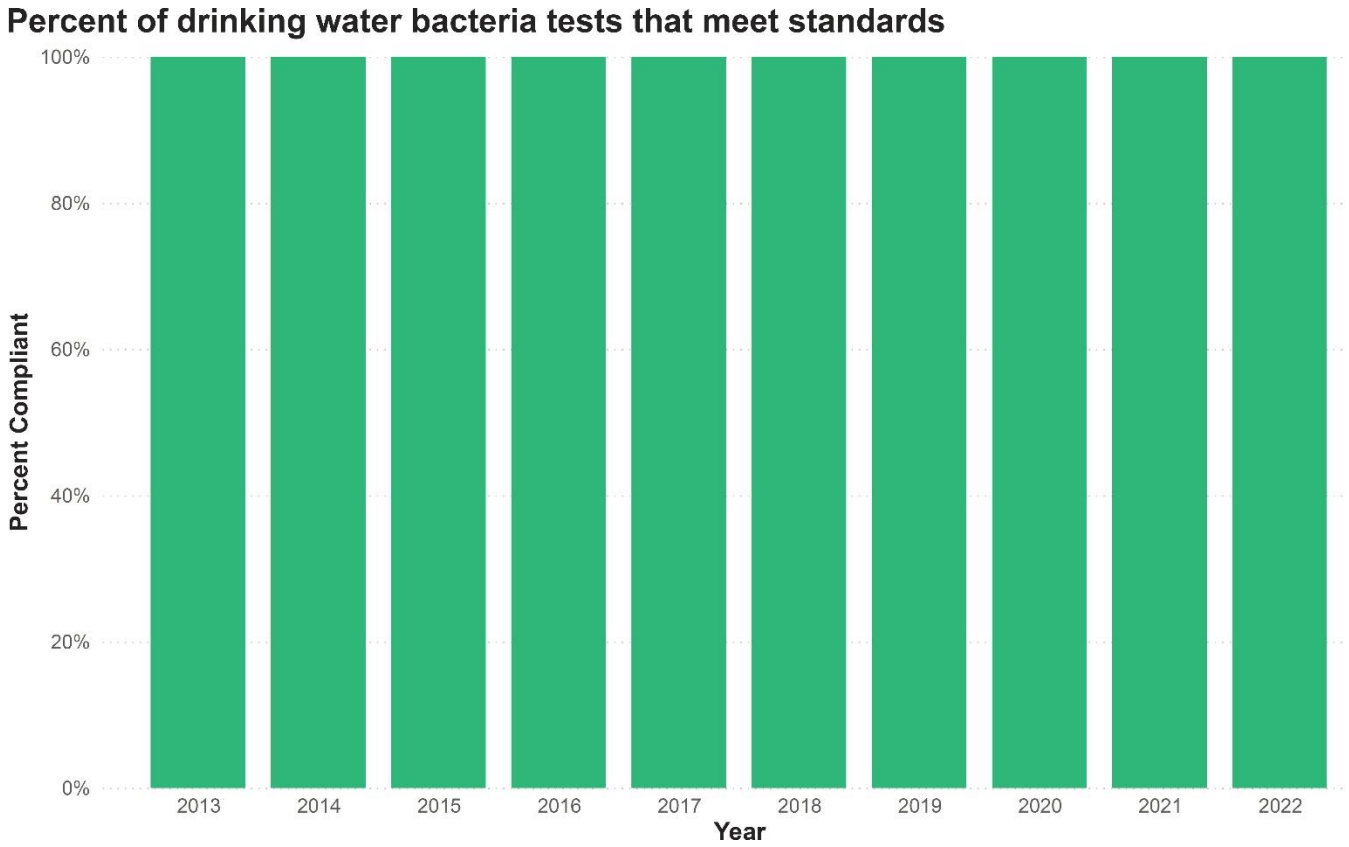


FIGURE 17: PERCENT OF COMPLIANT DRINKING WATER BACTERIA TESTS PER YEAR

Discussion

Redmond's water system has a "green" operating permit and a solid history of compliance with all state and federal regulations (Figure 18). Per DOH 331-339, the green operating status indicates that a system is substantially in compliance with regulations, and the system is viewed as adequate for existing uses and for additional service connections up to the number of approved connections.

Percentage of monitoring wells meeting Groundwater quality standards

0000002

Description

The City's groundwater monitoring network serves as an early warning system for our drinking water supply by helping us detect potential contaminants, including emerging contaminants of concern like PFAS, in the aquifer before they reach a supply well. The City conducts sampling from a subset of its well network twice a year to evaluate groundwater quality and determine areas for further monitoring and investigation.

Recommendation

Continue to monitor indicator wells as a baseline for exceedances and trends.

Continue to monitor emerging contaminants like PFAS on a six-year cycle and include detections of emerging contaminants in baseline monitoring.

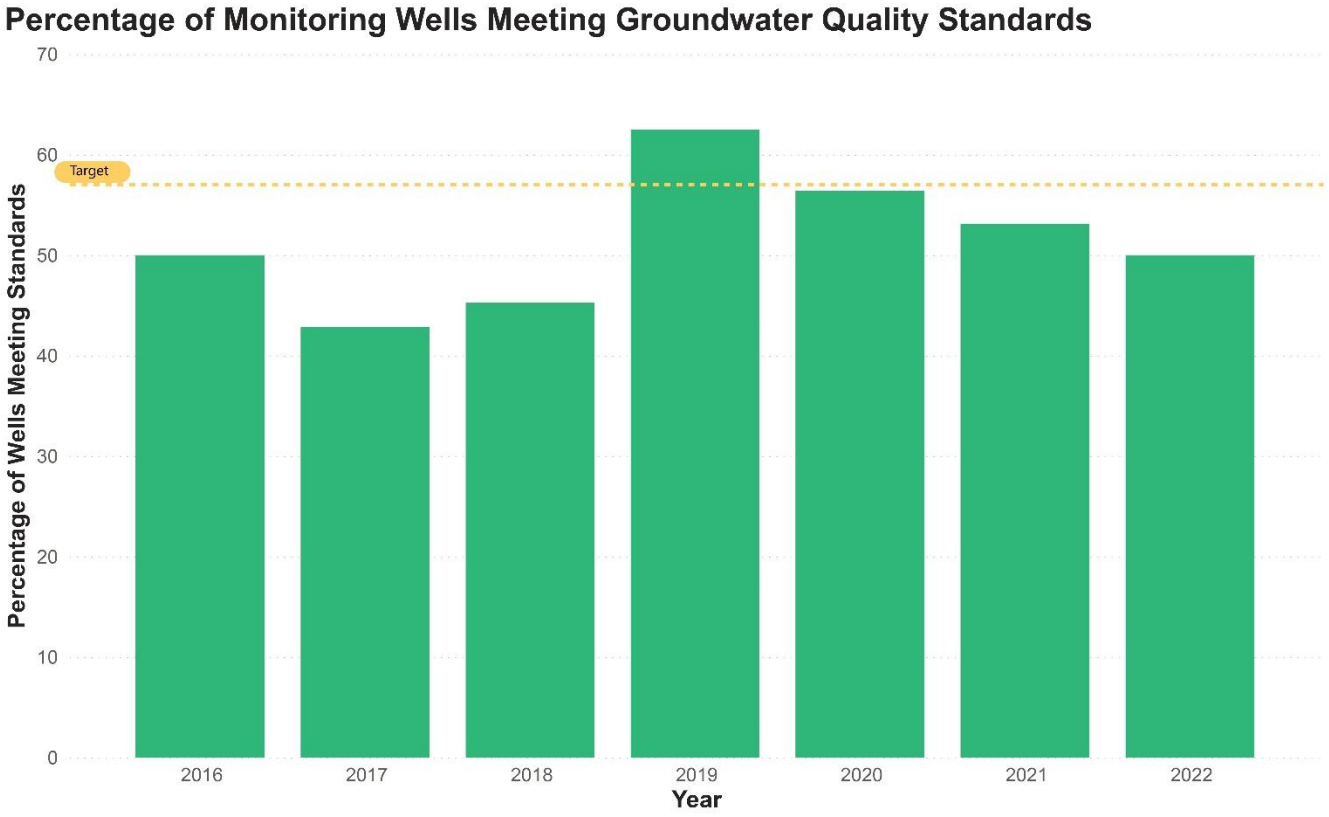


FIGURE 18: PERCENTAGE OF MONITORING WELLS MEETING GROUNDWATER QUALITY STANDARDS

Discussion

50% of the 26 monitor wells (MW) sampled in 2022 met water quality standards (Figure 19). Of the 13 monitor wells that exceeded state water quality standards:

- Nine of the monitoring wells had exceedances of only Iron and/or Manganese, which are secondary standards.
- Four other locations exceeded groundwater quality criteria for Arsenic, Iron, and Manganese, naturally occurring constituents.
- None of the 26 locations tested exceeded PCE (another contaminant tracked by Redmond) groundwater quality criteria, nor were they above the Maximum Contaminant Level (MCL) for PCE.
- None of the 10 locations tested detected Total or Fecal Coliforms (bacteria associated with animal waste).

Of the 26 sampled locations, 10 of them, known as indicator wells, have been sampled annually since 2018. 55% of the indicator wells met groundwater quality standards in 2022.

In 2023, we expect to have enforceable regulations at the state and federal levels for PFAS chemicals. With those new regulations, we may see a reduction in the number of monitoring wells that meet standards.

Percent of groundwater monitoring wells meeting primary Drinking Water standards

 0000003

Description

Primary drinking water standards are enforceable and health-based regulations (WAC 246-290-310) that are a subset of the MCLs described in section 9 above.

Recommendation

Conduct additional analyses at the four locations with exceedances of metal concentrations (like arsenic) to better understand the impact of higher turbidity on analytical results.

Consider locations with turbidity issues for a well-maintenance activity called redevelopment.

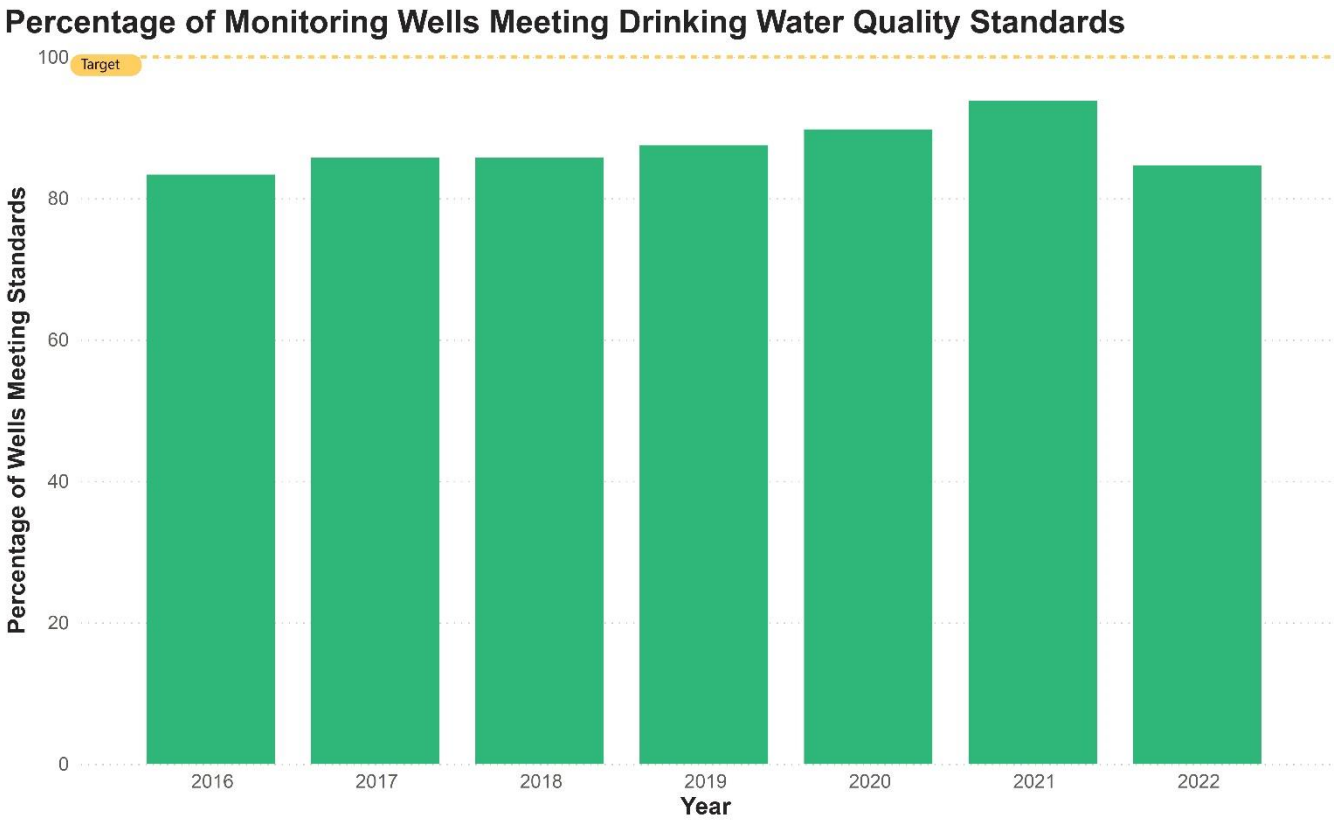


FIGURE 19: PERCENTAGE OF GROUNDWATER MONITORING WELLS MEETING DRINKING WATER QUALITY STANDARDS

Discussion

Out of the 26 locations sampled in 2022, four monitoring locations exceeded the primary drinking water MCL for arsenic. (Figure 20).

Washington State Department of Ecology recently performed a study of arsenic groundwater concentrations across the state. Their 2022 revised study concluded that background levels range to a level that is above the drinking water MCL standard. Two of the four Redmond locations that exceeded the arsenic MCL were within the background levels for Washington State.

In 2023, we expect to have enforceable regulations at the state and federal levels for PFAS chemicals. With those new regulations, we expect to see a reduction in the number of monitoring wells that meet primary drinking water standards

Percentage of high-risk sites visited, and technical assistance provided

0000002

Description

Reducing the risk of contamination to our shallow drinking water aquifer will ensure the long-term preservation of this valuable community resource. Annual reoccurring pollution prevention inspections at sites with significant pollution risks and ongoing compliance issues minimize the chance that contamination of the aquifer will occur.

Recommendation

Continue to provide annual pollution prevention technical assistance at high pollution risk sites.

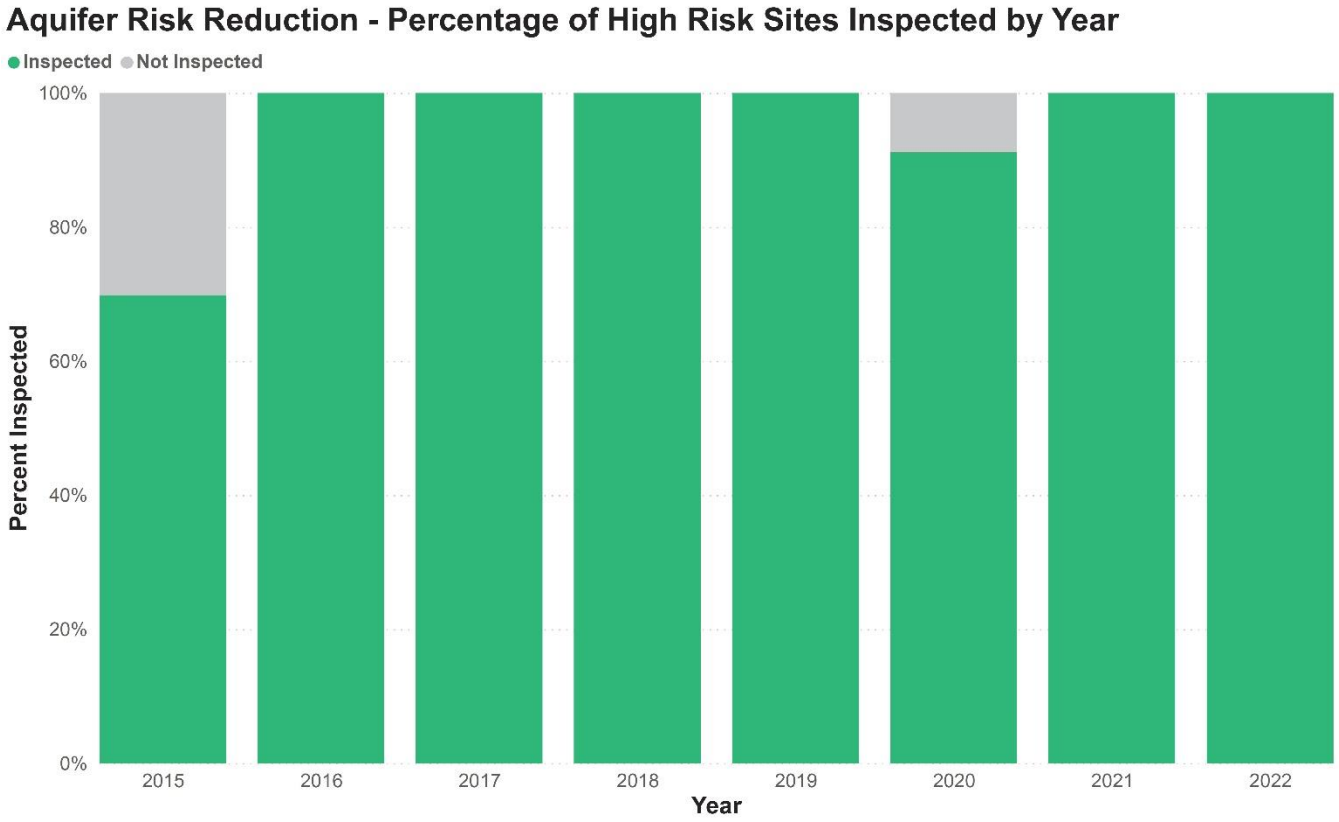
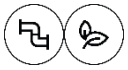


FIGURE 20: AQUIFER RISK REDUCTION – PERCENTAGE OF HIGH-RISK SITES INSPECTED ANNUALLY

Discussion

In 2022, Redmond conducted annual pollution prevention technical assistance visits at 30 out of 30 identified high-risk sites (Figure 21). In 2022, four high-risk sites were removed for annual inspection because they reduced on-site quantities of hazardous materials, thereby reducing their potential pollution risk; one high-risk site was relocated, and no new sites were identified.

High Priority Septic Removal



Description

Septic systems consist of a septic tank and a drain field to dispose of and treat wastewater from a household. Wastewater from drain fields close to a body of water can cause contamination of those water bodies. Drain fields located in the CARA can cause wastewater to contaminate the City's drinking water supply. Also, failing septic systems can cause wastewater to surface and become a health hazard to people, animals, and the environment. The Redmond Municipal Code calls for the removal of all septic systems in the City as a public health measure. To advance that effort, the City's Utilities Strategic Plan calls for the removal of high-priority septic systems within City limits by 2050. High-priority septic systems are defined as old, failing, close to a body of water (creek, stream, river, pond, lake), or in the City's Critical Aquifer Recharge Area (CARA).

Recommendation

Evaluate establishing a more aggressive and targeted approach to reach the USP goal of "zero high-priority septic systems by 2050". That targeted approach could include the following measures:

- Require parcels located within 200 feet of the existing sewer to connect to the sewer. If that is not feasible, require those parcels to pay a sewer availability charge that would later be applied to their required connection charges when they eventually connect to the sewer.
- Develop a CIP program to extend sewer into areas with septic systems, first targeting high-priority septic systems.

Develop financial incentives such as loans or rebates to encourage properties currently on septic to connect to the sewer.

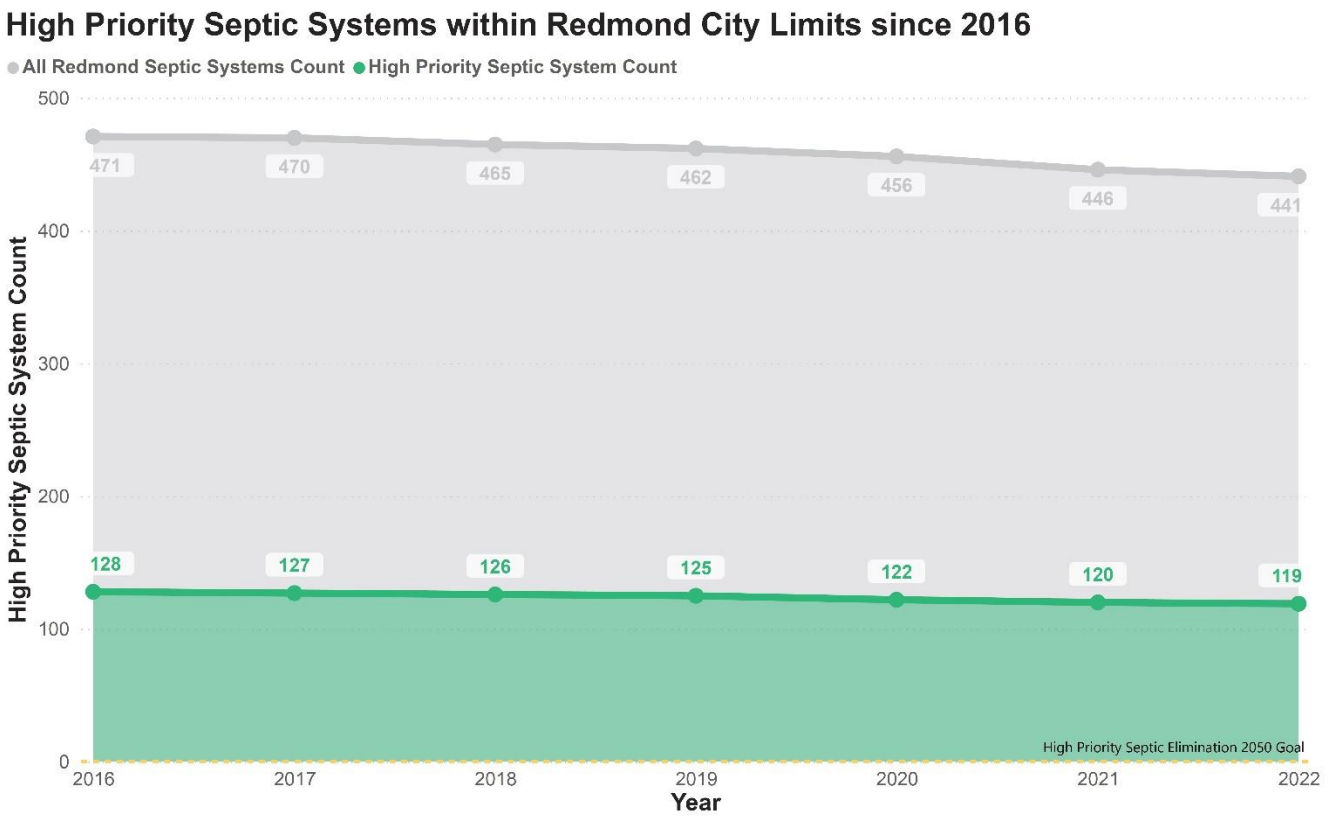


FIGURE 21: HIGH-PRIORITY SEPTIC SYSTEMS WITHIN REDMOND CITY LIMITS SINCE 2016

Discussion

The City of Redmond currently estimates that 439 parcels rely on septic systems to dispose of wastewater; 119 are considered "high priority" as of January 1, 2023. This is a reduction from 128 high-priority septic systems in 2016 (Figure 22). Redevelopment of septic parcels has been the primary reason for the reduction in high-priority septic systems. Some other septic parcels have voluntarily connected to gravity sewers after their septic systems have failed. The City of Redmond expects septic use to continue decreasing as existing regulations do not allow septic development and encourage removal.

IV. Provide Reliable Utility Services

While Redmond is known worldwide as the headquarters for multi-national technology companies, as a City, we can do more to leverage the use of technology to wisely manage our utility infrastructure. Staff stay informed of innovations related to municipal utility management and evaluate new technologies. By deploying the right technology in the right ways, Public Works staff can use data to inform decisions regarding utility systems maintenance, replacement, expansion, and upgrades.

City Well Production versus Cascade Water Alliance (Cascade) Supply

Description

Redmond maintains five municipal water supply wells that provide roughly 40% of Redmond's drinking water needs. The remaining 60% is supplied through Cascade Water Alliance (Cascade). City well production is especially important during the peak season (Summer) to support higher demands. As a member of Cascade, Redmond has an obligation to provide water from our municipal supply wells. The peak-season average obligation is 3.51 million gallons per day (mgd). If the obligation is not met, Cascade could impose penalties.

Cascade is a surface water source and is more susceptible to changes in precipitation patterns and reduced snowpack. Having a dual system increases Redmond's resiliency to climate change and emergencies. This section supports the Utilities Strategic Plan (USP) Strategy 9, "Responsibly manage the City's groundwater resources."

Recommendation

Continue to pursue Temporary Construction Dewatering (TCD) Policy changes to minimize impacts to city well production.

Continue to pursue options to optimize the production of Well 4 water rights during peak-season demand needs.

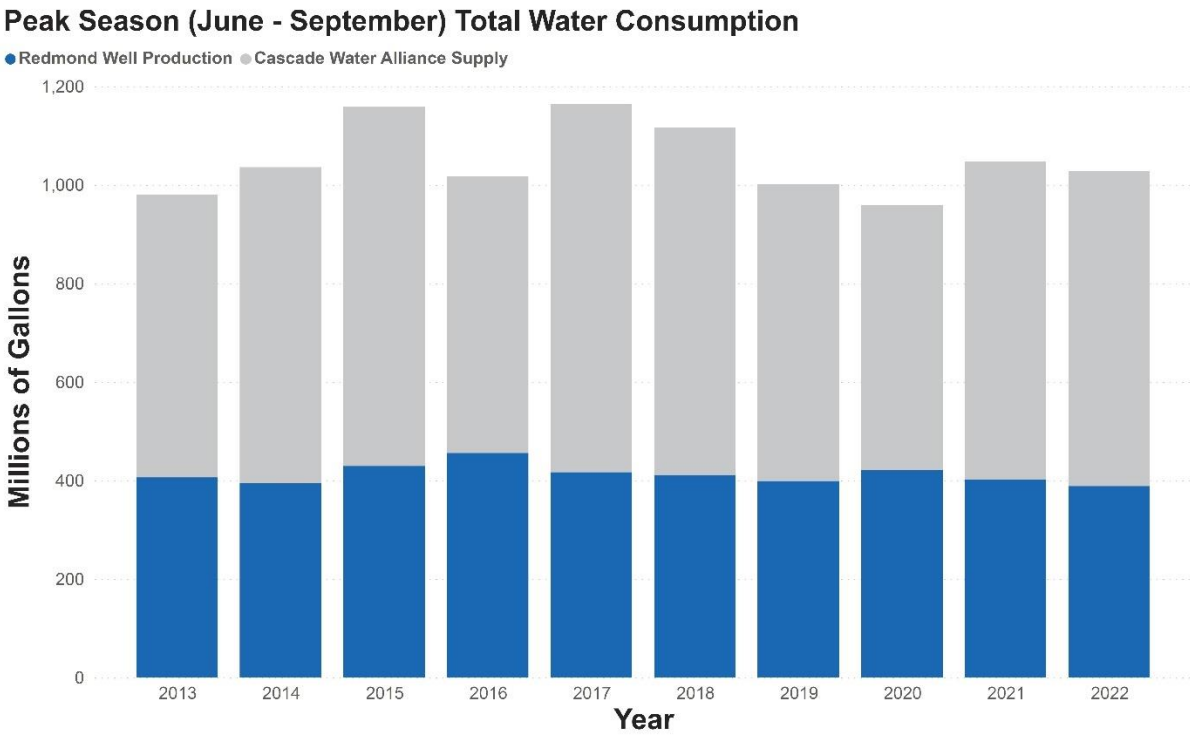


FIGURE 22: PEAK SEASON CITY WELL AND CASCADE WATER ALLIANCE CONSUMPTION BY YEAR.

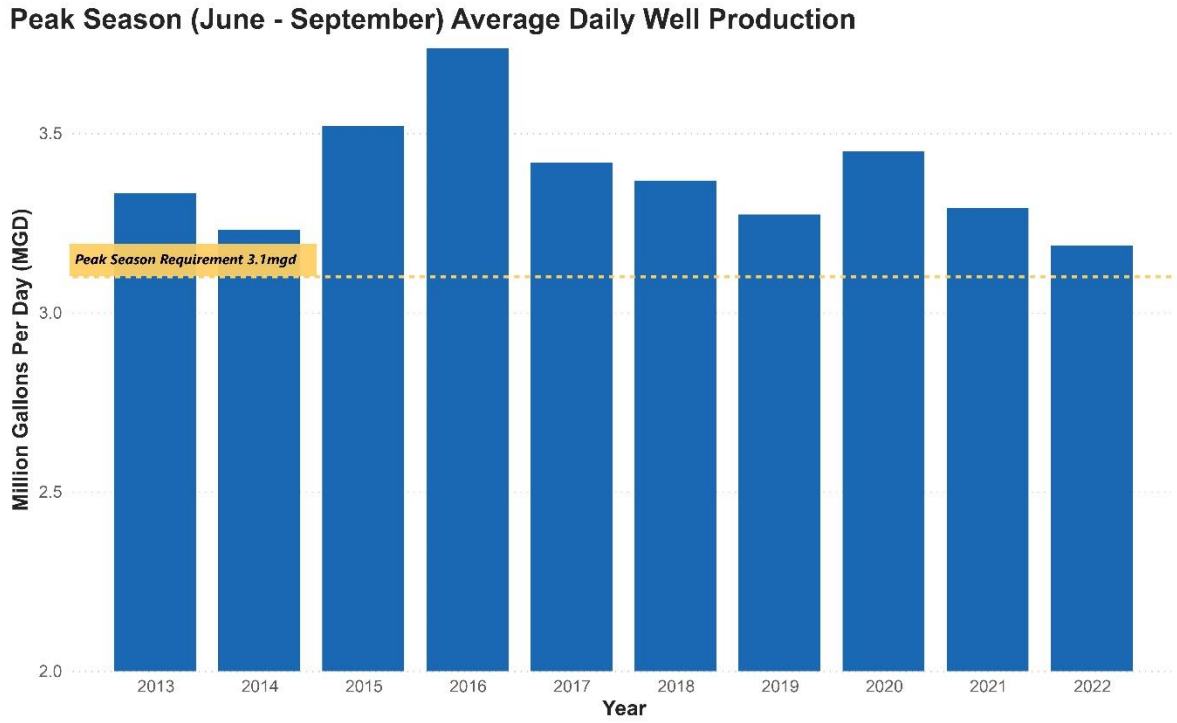


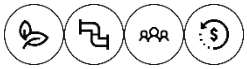
FIGURE 23: AVERAGE PEAK SEASON CITY WELL PRODUCTION VS. CASCADE WATER ALLIANCE TARGET

Discussion

Over the past ten years, during peak season, Redmond supply wells have produced between 389 and 456 million gallons. The remaining demands have been met by the Cascade supply (Figure 23). Redmond produces, on average, 35% and receives 65% from Cascade. Fluctuations in total water consumption since 2013 are attributed to growth, economy, and weather. Variations in water consumption from City Supply Wells can be linked to several factors, including changes in demand due to weather, impacts due to TCD, and well repairs. 2020 had a noticeable decrease in overall demand due to pandemic impacts to the commercial sector. (Figure 23).

Redmond consistently meets Cascade obligations during the peak season (June 1 through September 30), as shown in Figure 24. Increases in well production during peak season in 2015, 2016, and 2020 are attributed to Supply Well 4 being fully operational. In 2022, a slight demand increase was attributed to corrections in Utility Billing monthly reports in the joint-use areas (Kirkland and Bellevue).

Water Main Breaks

 0000003, 0000039

Description

Main breaks and major leaks are a normal part of operating a water utility. A variety of factors can result in a break, including ground shifts from temperature changes, overly dry or wet conditions, as well as pipe age and sudden fluctuations in pressure. To better plan and prepare for water main breaks, Redmond tracks the number of main breaks for every 100 miles of water pipe. This allows Redmond staff to understand break frequency and watch for possible increases in breaks as the water infrastructure continues to grow.

Recommendation

Continue comprehensive Pressure-reducing valves (PRVs) maintenance program. PRVs regulate pressure in the water system, thereby ensuring more consistent pressures throughout the water system, especially during off-peak evening hours. This program has correlated with a reduced occurrence of water main breaks compared to historic levels.

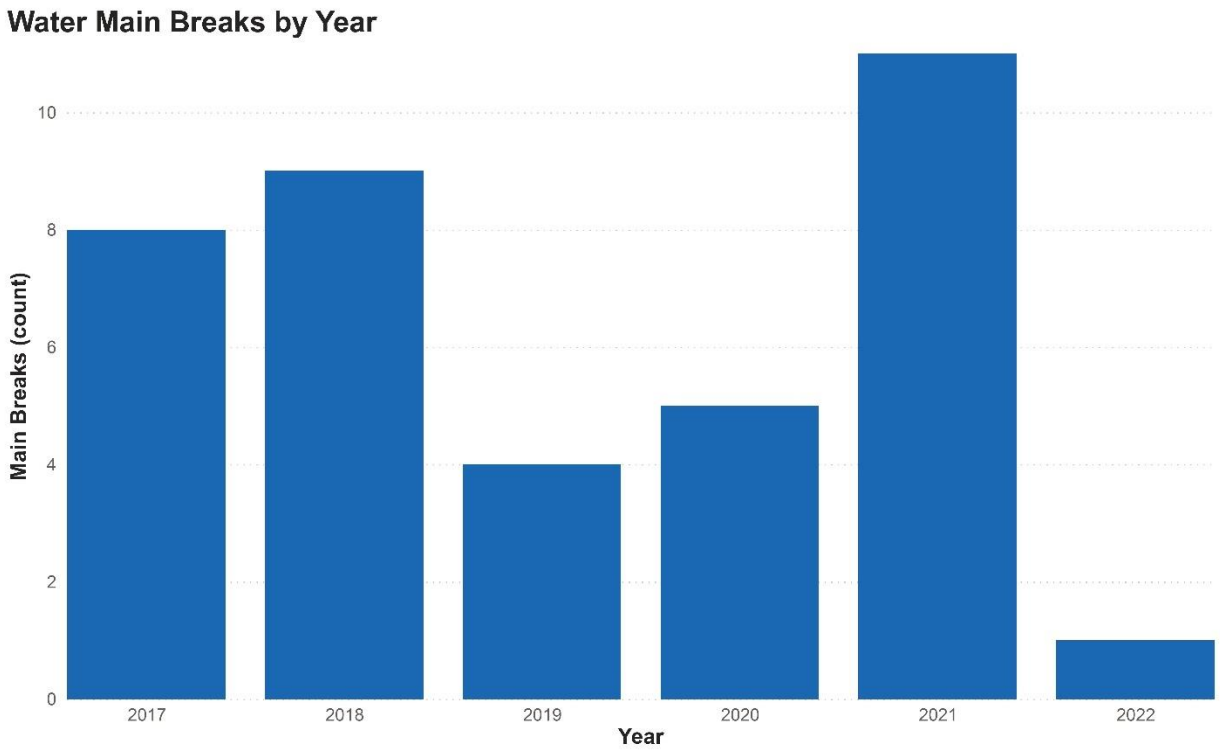


FIGURE 24: WATER MAIN BREAKS BY YEAR

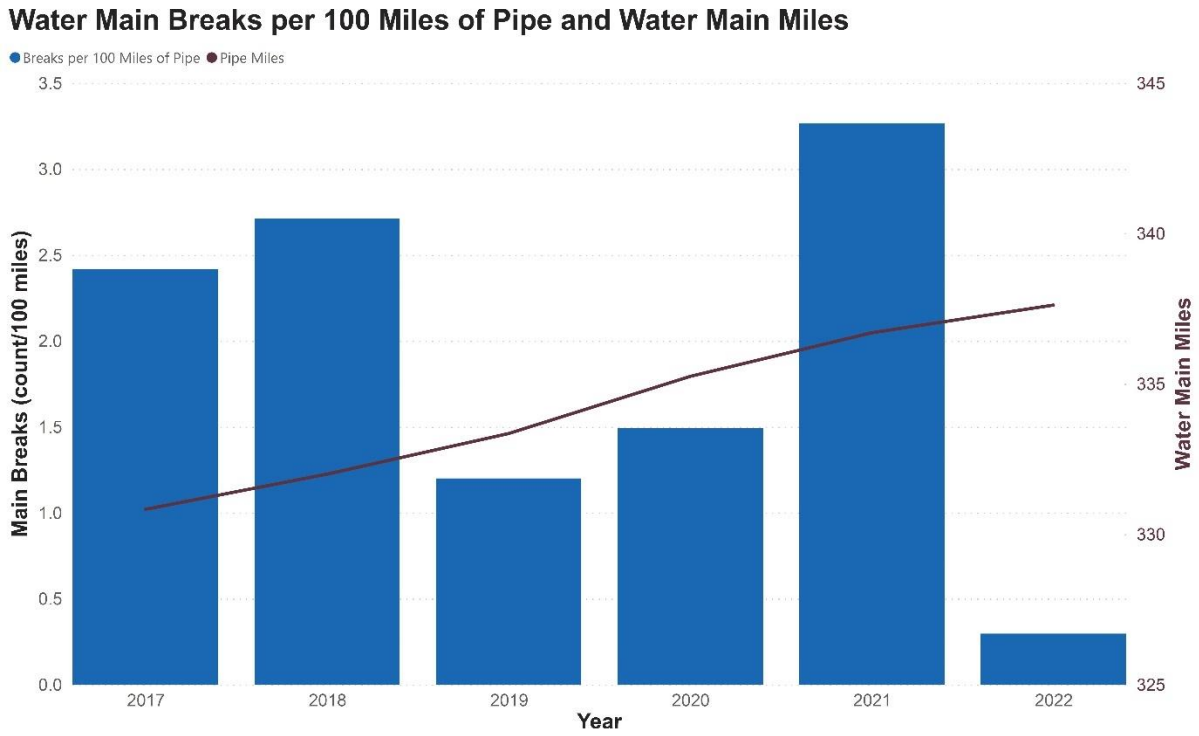


FIGURE 25: WATER MAIN BREAKS PER MILES OF PIPE BY YEAR AND PIPE MILES

Discussion

In 2021 there were 11 total main breaks, the highest number of breaks since 2017 (Figure 25). While water main infrastructure has continued to increase, it has not resulted in a direct increase in water main breaks as higher breaks were seen in earlier years, 2017 and 2018, and lower break counts are seen in recent years, 2019, 2020, and 2022 (Figure 26). 2021 proved to have some anomalies, with two contractor hits and two breaks on the same Asbestos Cement main that was ultimately abandoned after a new connection with Bellevue was built. Additionally, in 2021, another break occurred when a valve broke during an inspection. If these were removed, our 2021 number would be more on track with other years.

Wastewater CCTV Inspections

Description

Redmond's wastewater (WW) collection system consists of approximately 230 miles of sewer pipe. This system provides the conveyance of City wastewater to the King County Brightwater treatment plant facility. To ensure the system is functioning properly, the City has established an annual closed circuit television (CCTV) inspection program. The WW CCTV program goal is to inspect all pipes every seven years, which amounts to approximately 32 miles of the City's total sewer system per year. These inspections result in the ability to target maintenance or capital replacements to prevent sewer overflows.

Recommendation

Establish a consistent CCTV equipment maintenance program to provide reliable equipment and less downtime. Increase operational budget to allow for annual maintenance of CCTV equipment ($2,000/annually).

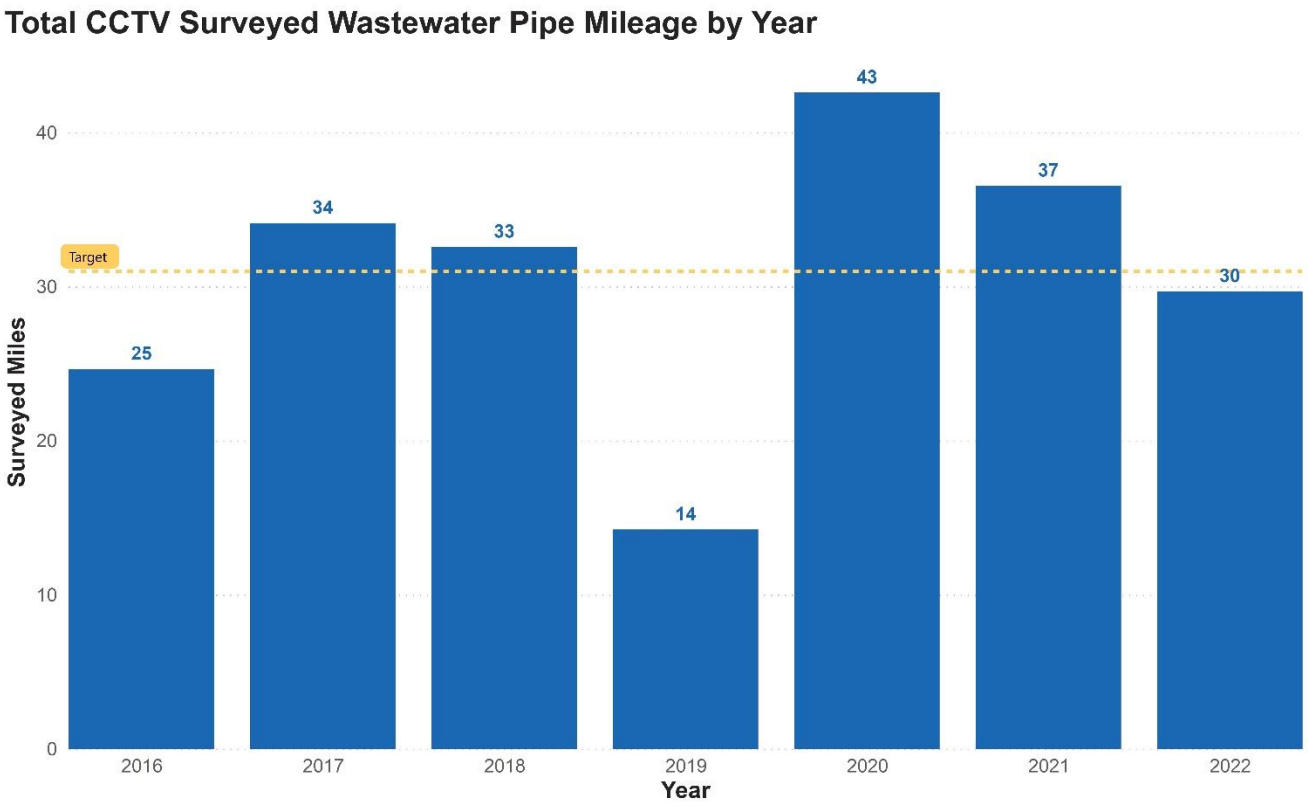


FIGURE 26: WASTEWATER MAIN PIPE MILES INSPECTED PER YEAR.

Discussion

In 2022, the Wastewater department inspected 30 miles of pipe, falling slightly short of our annual inspection goal (Figure 27). The WW CCTV program has varied in meeting its annual goals since 2016. This variance can be attributed to staffing turnover and equipment downtime.

The Utilities Strategic Plan WW CCTV goal of "100% of wastewater pipes inspected every seven years using CCTV" comes from EPA recommendations found in the Capacity, Management, Operation, and Maintenance (CMOM) program. The current CCTV program strategy has resulted in approximately 80% of all system pipes being inspected in the past seven years.

Sanitary Sewer Overflows

0000147, 0000039

Description

The Redmond Wastewater system is made up of 230 miles of pipe, 7,800 manhole structures, and 22 lift stations. There can be various causes of sanitary sewer overflows (SSOs) within a WW system. The most common cause is grease blockages in the pipe or foreign objects introduced into the system.

Additional causes include pipe capacity, water infiltration, and power outages to lift stations. SSOs can cause environmental impacts to our stormwater systems, surface waters, groundwater, and health concerns for the public.

Recommendation

Continue implementation of new sewer installation requirements to reduce contractor-cause Sanitary Sewer Overflows (SSOs).

Continue to work with City inspection staff to identify other issues impacting contractor caused SSOs.

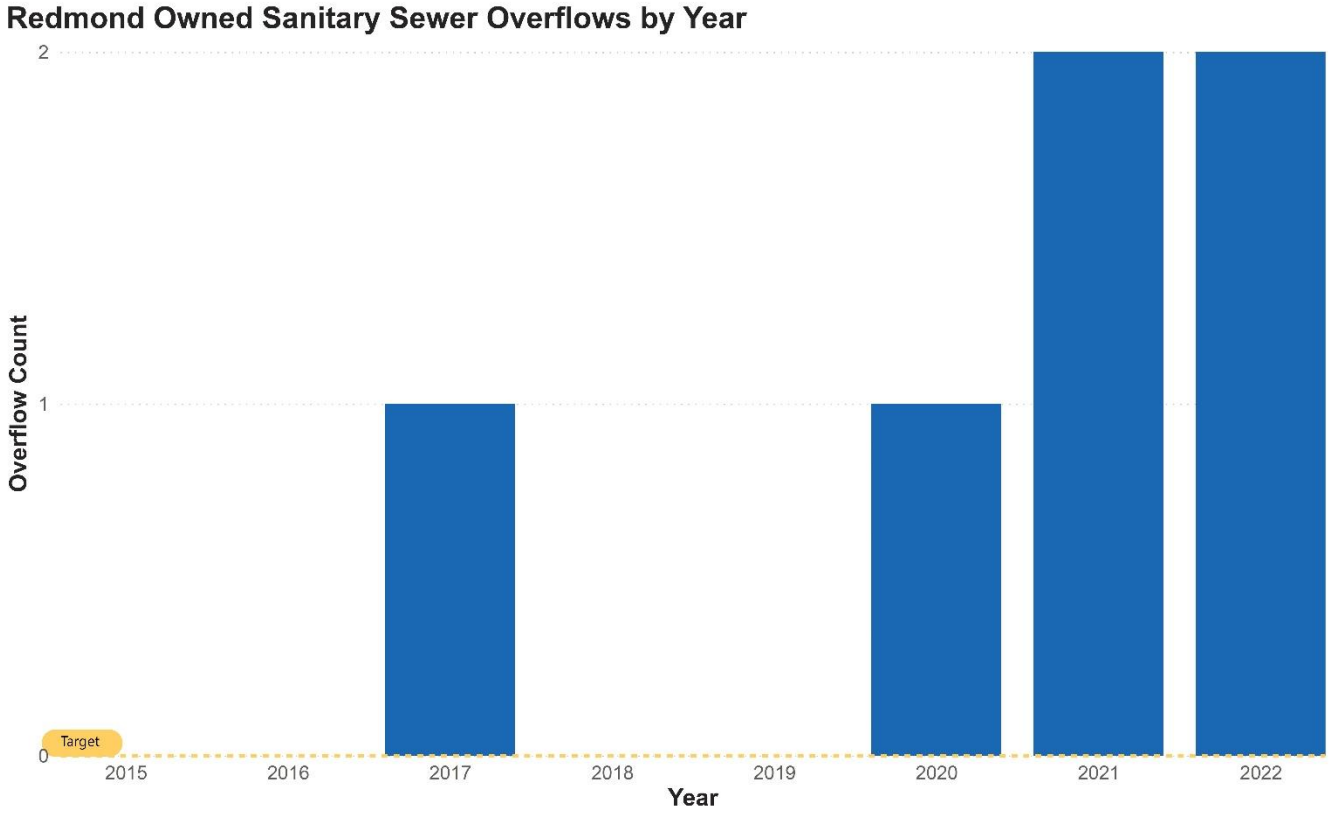


FIGURE 27: REDMOND OWNED SANITARY SEWER OVERFLOWS BY YEAR

Discussion

In 2022 the Wastewater collection system experienced two sanitary sewer overflows. Fortunately, both sanitary sewer overflows were minor spills attributed to contractors leaving pipe plugs in the system.

Runoff Flow Control

0000004

Description

Controlling stormwater runoff flow is critical to minimizing the risk of flooding and protecting streams from erosion and habitat destruction. Redmond's Stormwater Engineering team is responsible for reviewing public and private development plans and ensuring they meet current flow control requirements. Flow control standards have changed over time, with larger, more effective facilities required now. As older facilities are replaced with new development, the amount of "adequate flow control" collectively improves citywide. Redmond has set an ESAP goal of providing flow control to 100% of the areas that need it by 2050.

Recommendation

There are two key recommendations that should be considered for this performance measure.

1. Evaluate the GIS layer to determine accuracy of flow control estimates, revise as needed to improve measure.
2. Determine capital investment needed to meet long-term flow control goals and build into Stormwater Comprehensive Plan taking climate impacts into account.

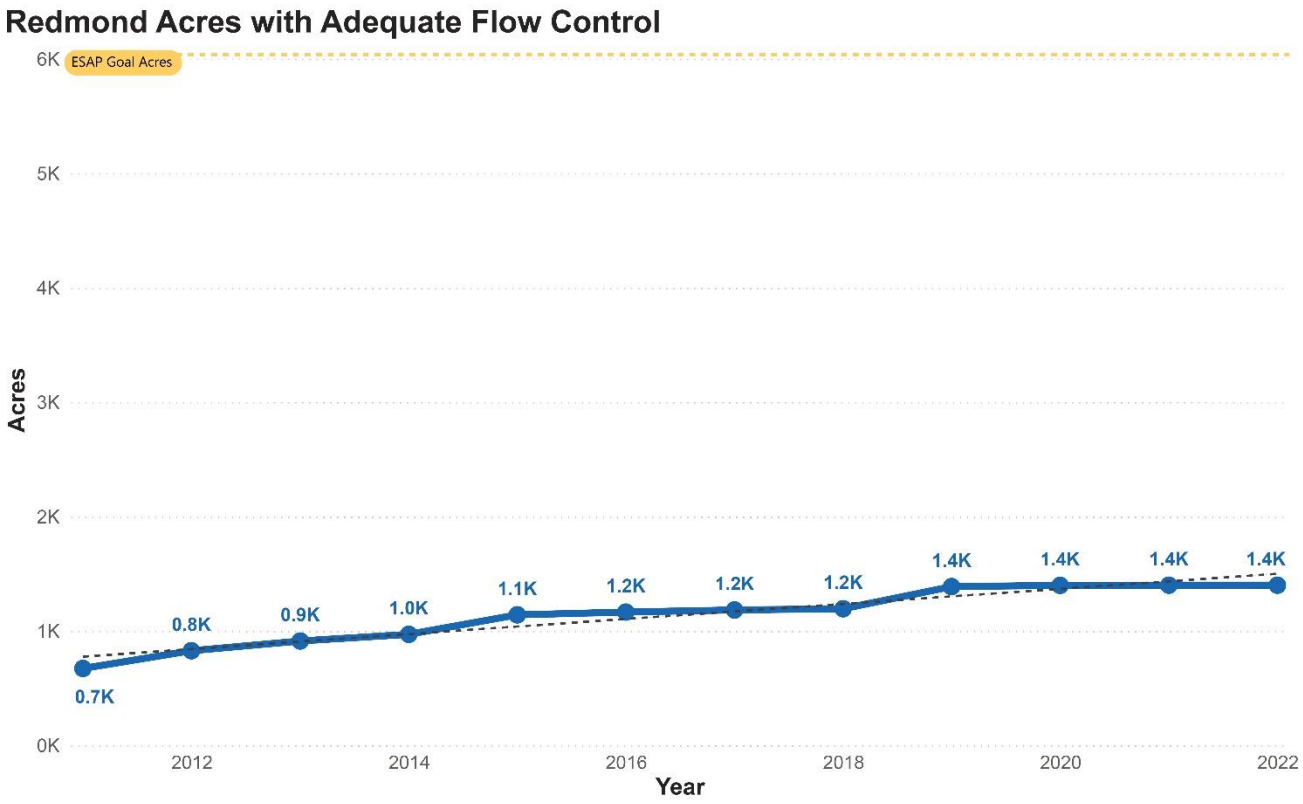


FIGURE 28: REDMOND ACRES WITH ADEQUATE FLOW CONTROL

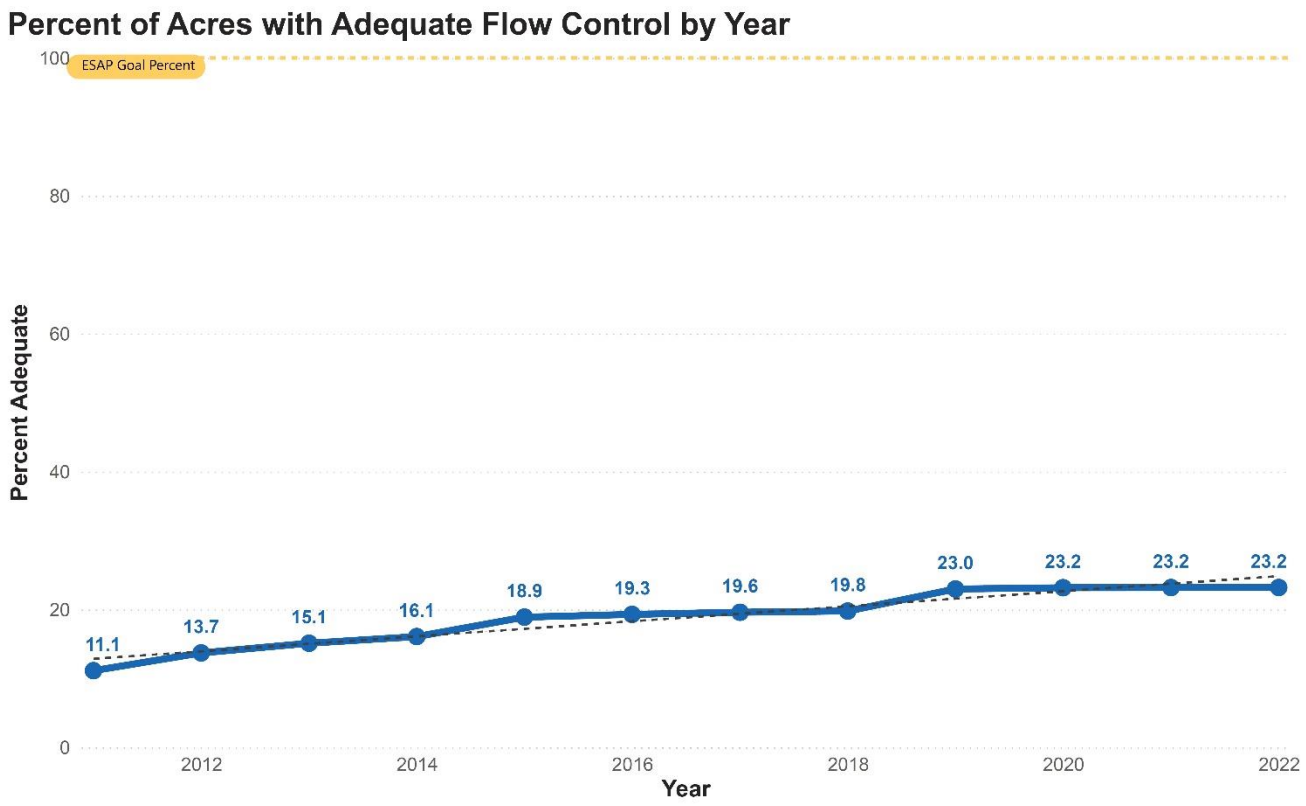


FIGURE 29: PERCENT OF ADEQUATE FLOW CONTROL

Discussion

There were zero acres of runoff flow control added in 2022, according to current GIS records. The acreage and percentage of required areas with adequate flow control have been slowly increasing since 2011 (Figures 29 and 30). This steady growth is expected as new development and maintenance projects install stormwater networks that fully meet flow control standards. However, the current trend is not sufficient to meet current ESAP goals. The data provided in Figures 29 and 30 show that at our current rate of increase from the past ten years, we will not meet the acreage nor percentage goals of Redmond's ESAP.

1. At 700 acres per decade, Redmond would have an additional 2100 acres by 2052 totaling 3500 acres, below the goal of 5646 acres.
2. At 12% per decade, Redmond would have an additional 48% of adequate flow control by 2062 totaling 71%, below the goal of 100%.

Stormwater NPDES Catch Basin Inspections

Description

Redmond's public stormwater system includes more than 12,000 catch basins. Catch basins help "catch" sediment, grit, and other solids, thus preventing these solids from clogging pipes and reaching and impacting our creeks, lake, and wetlands. Redmond is required to inspect each of these catch basins at least every two years to ensure they function as designed. Our stormwater permit requires the City to perform "function-critical" maintenance within six months of inspections.

Recommendation

Continue to fully inspect 100% of City-owned catch basins every two years to identify maintenance needs and ensure ongoing compliance with federal NPDES permit requirements. Over time, analyze cleaning and maintenance patterns to identify geographic areas, land use types, or catch basin features (age, design, etc.) associated with greater cleaning or repair efforts. Look for strategies to prevent or minimize maintenance needs.

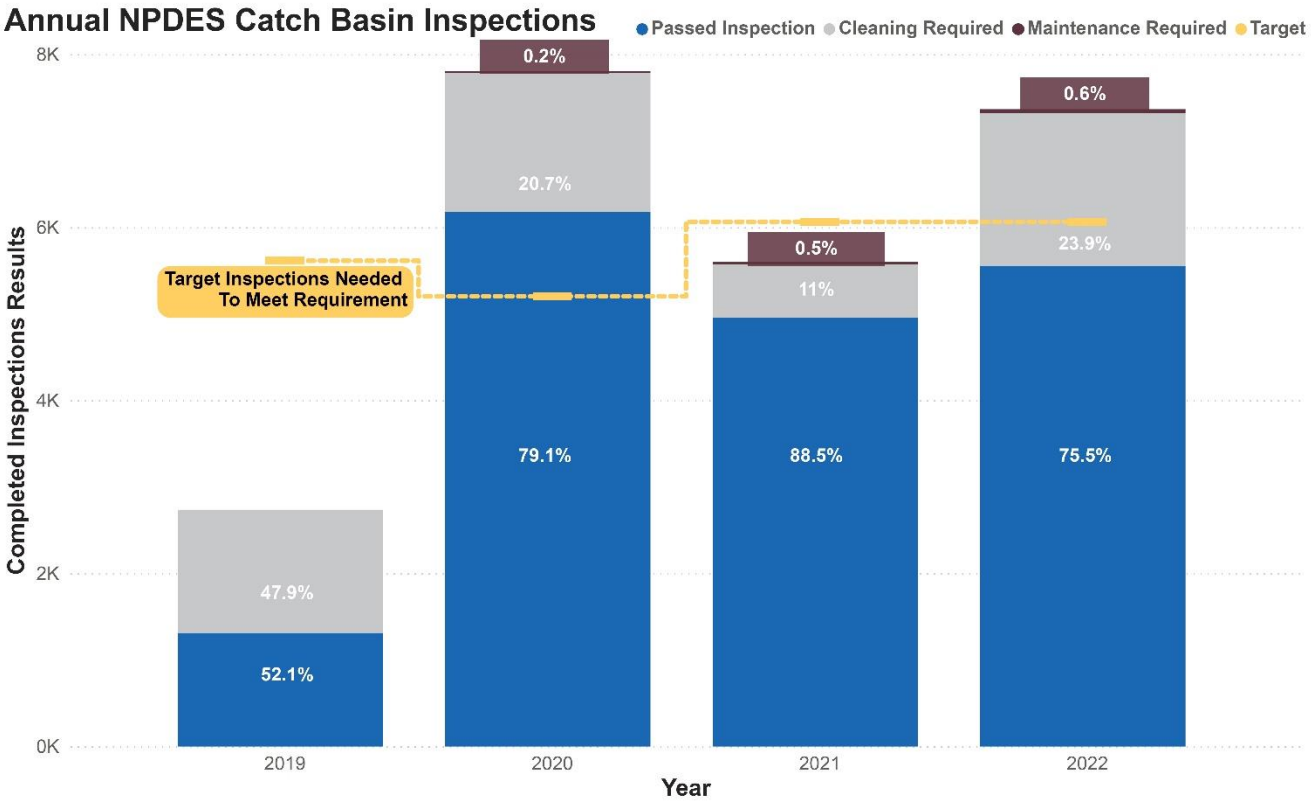


FIGURE 30: NUMBER OF COMPLETED NPDES REQUIRED CATCH BASIN INSPECTIONS SINCE 2019.

Discussion

The City has met or exceeded its catch basin inspection target in each two-year cycle described above. Since 2020, the percentage of catch basins requiring cleaning or maintenance has been below 25%. Of special note, the percentage (and number) of catch basins requiring maintenance/repair is quite low, indicating that earlier maintenance efforts have established a well-functioning, well-maintained system. Catch basin cleaning needs, however, have remained fairly steady. Future analyses of catch basin inspection data may allow the Stormwater Utility to pinpoint areas, based on land use or topography, or other factors, that show high sediment loading to catch basins. This analysis could inform other City activities, such as street sweeping or construction site management.

Solid Waste and Recycling QAlert Response Time

Description

The City's "Your Redmond" QAlert system offers community members a way to ask questions and submit service complaints about waste services through an online and mobile device portal. It allows residents to upload pictures and provide relevant information about their requests. Solid Waste and Recycling has three question categories in this system that residents use to connect with staff. Timely customer service in replying to complaints and questions is a primary goal.

Recommendation

Measure service request response time and evaluate root causes for response times exceeding 48 hours.

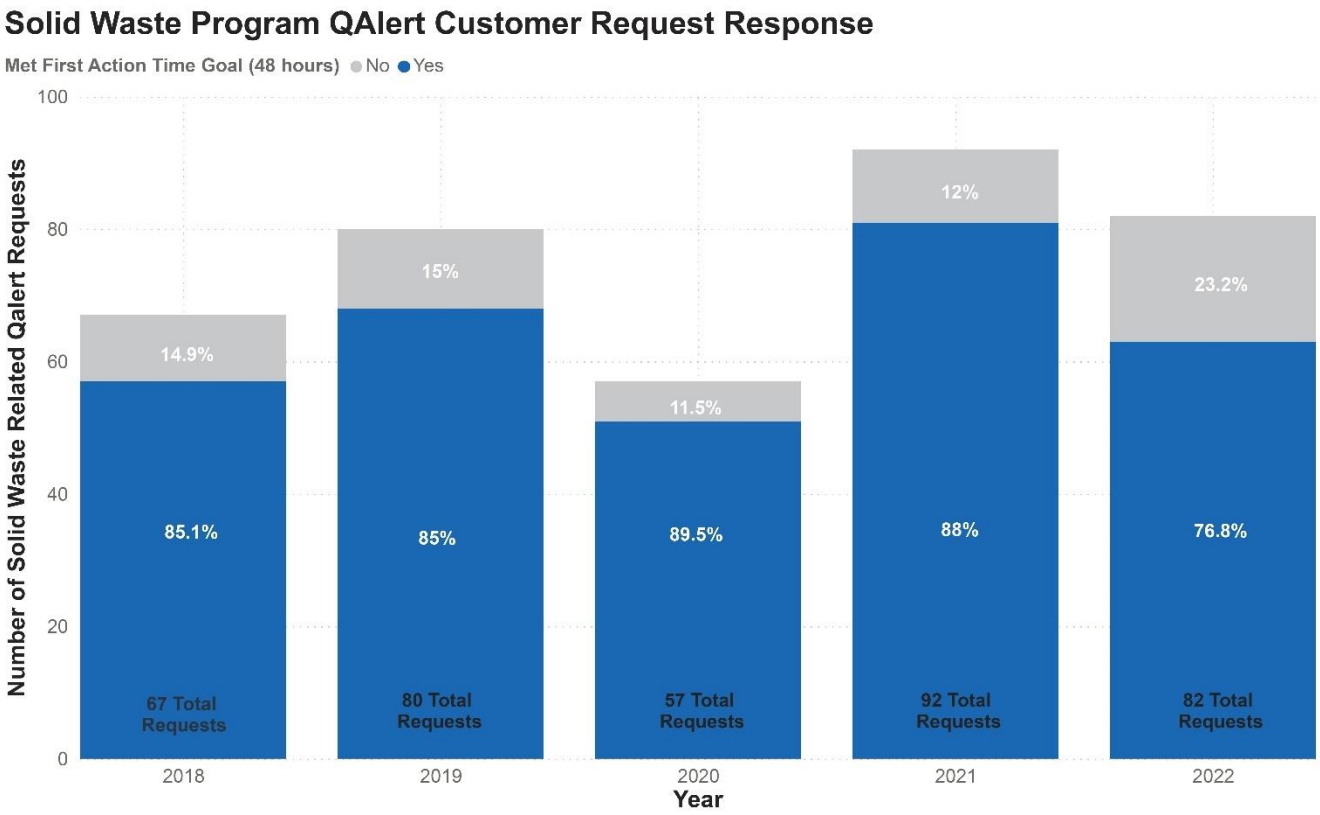


FIGURE 31: SOLID WASTE PROGRAM RELATED QALERT REQUESTS

Discussion

Goals for this year are to raise the percentage of requests responded to within 48 hours. This year the City will be evaluating what success looks like for this measure and setting goals.

Waste Management (WM) Regional Customer Service Response

Description

As a part of managing the City's contracted solid waste service provider, WM, staff monitors data from the WM call center to determine if they are meeting the performance goal of customer service levels outlined in the contract. Failure to meet these customer service levels results in performance fees assessed to WM. The two metrics used to determine the call center's performance are Average Speed of Answer (ASA), which is required to be under 30 seconds, and Abandoned Call Rate (ABA), which is required to be less than 10% of inbound calls.

Recommendation

Continue to work with WM to increase compliance with this performance measure. The City will continue to assess performance fees in months where this measure is not met.

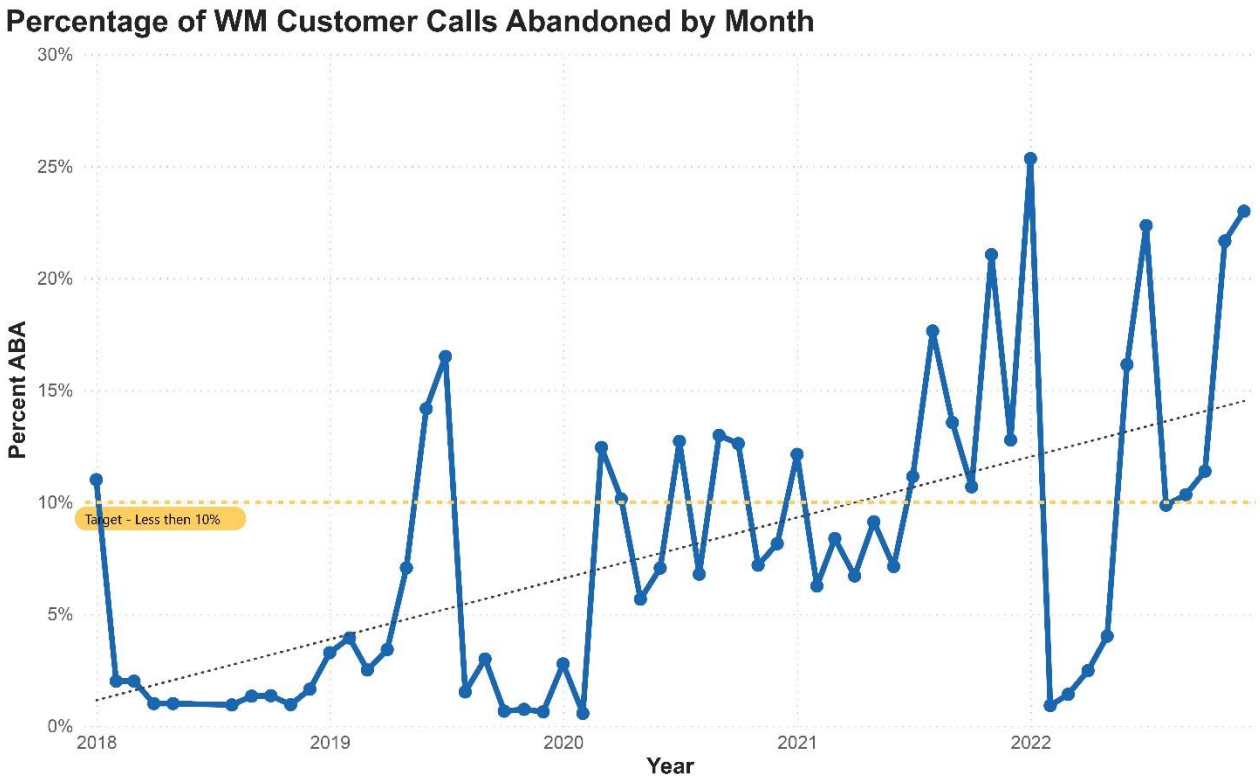


FIGURE 32: PERCENTAGE OF WM'S CUSTOMER CALLS ABANDONED BY CUSTOMERS.

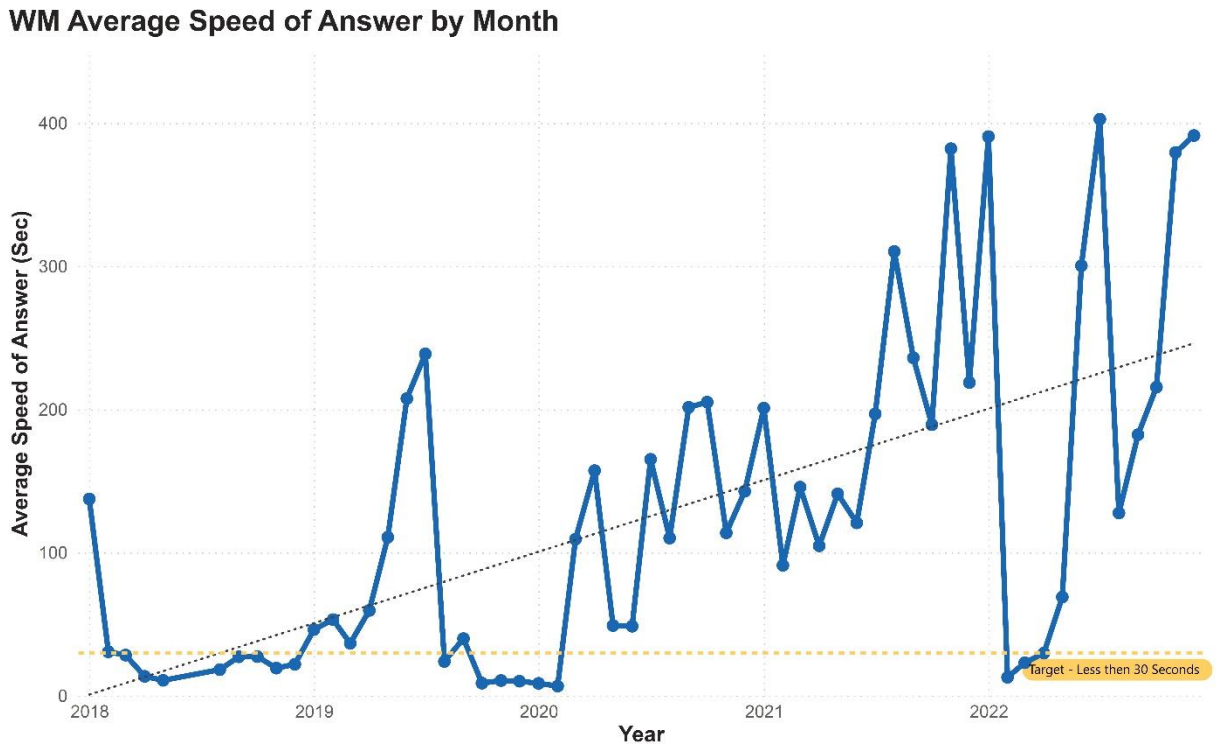


FIGURE 33: WM AVERAGE SPEED TO ANSWER CUSTOMER CALLS PER MONTH

Discussion

While COVID caused a widespread disruption of WM's ability to regularly staff call centers and provided challenges with moving to at-home call center employees, it is clear that performance measure compliance is on a steady downward trend. While WM continues to promise to improve by hiring more staff and moving more residents to an online platform for service changes and billing questions, little impact has been seen. Staff are working with WM to improve and continue to assess fees when standards are not met.

V. Maximize Waste Reduction and Reuse

Currently, there are no state or federal policies in place to incentivize waste reduction. Therefore action at the local level is especially impactful. Diverting waste from landfills is one of the most direct strategies that Redmond can focus on to reduce the environmental impacts of the community's consumption. (ESAP)

Increase Community Waste Diversion

0000006

Description

The Community Waste Diversion measure includes all the garbage, organics, and recycling waste collected from single-family households, commercial businesses, and multifamily properties. Waste diversion measures the percentage of waste not sent to the landfill but instead recycled or composted. Diversion rate increases with participation in recycling and organics programs. The more materials that are recycled or composted and returned to the market instead of landfilled, the less extraction of natural resources is required. Waste diversion also helps extend the life of the regional landfill. This metric addresses the ESAP M1 Strategy with targeted goals of a 70% diversion rate by 2030 and an 80% diversion rate by 2050.

Recommendation

Implement the Construction and Demolition Debris program and begin to track tonnage from this new sector to increase community waste diversion. Additionally, continue to partner with King County Solid Waste on the implementation of the RE+ program, an innovative regional approach to increasing waste diversion.

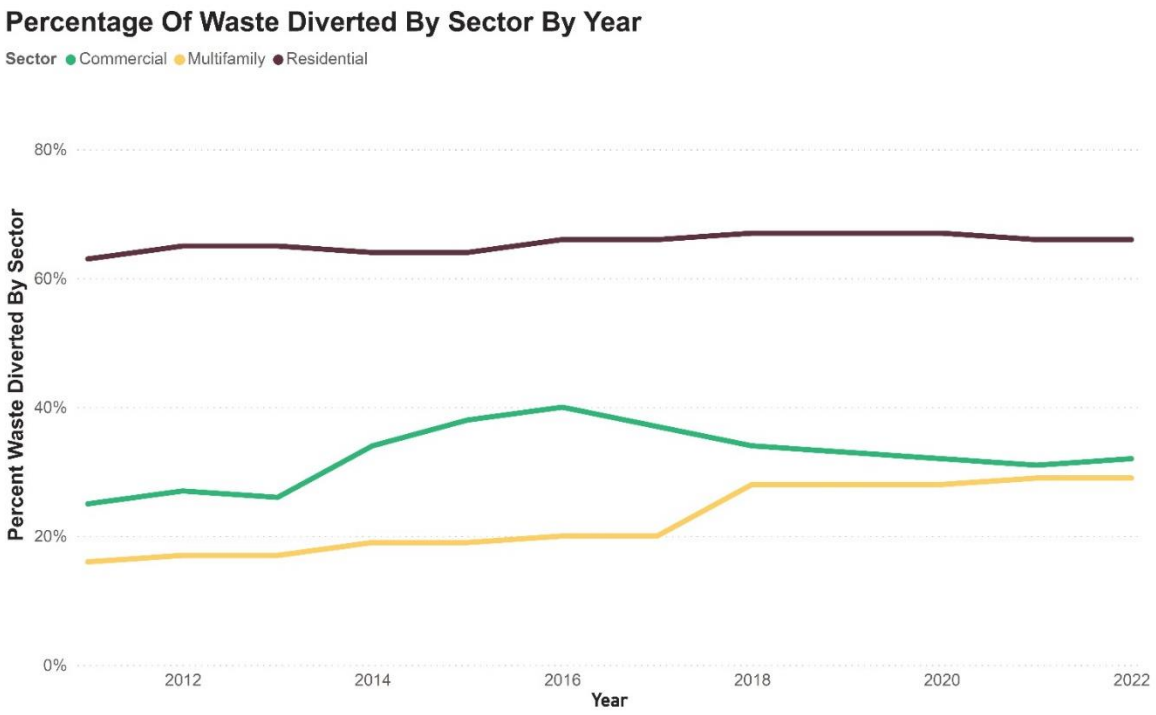


FIGURE 34: PERCENTAGE OF WASTE DIVERTED BY YEAR BY SECTOR

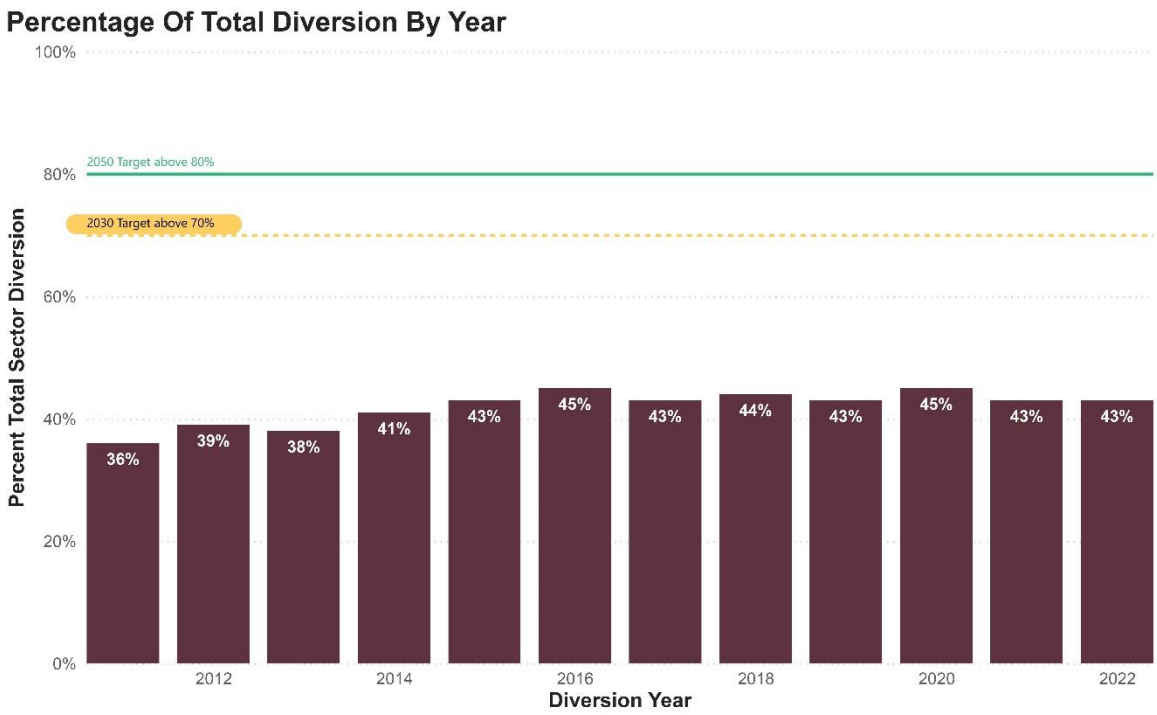


FIGURE 35: PERCENTAGE OF TOTAL DIVERSION

Discussion

While the diversion rate from residential customers has remained relatively steady, the multi-family and commercial programs have varied over time (Figures 35 and 36). Programs allowing commercial and multifamily customers to collect food waste have increased diversion. Additionally, new programs to track construction and demolition waste should have an immediate impact on the City diversion rate beginning in 2024.

Single Family Household Total Waste Stream

Description

The Single-Family Waste Stream includes all waste generated by single-family homes, which is collected and transported to composting facilities, recycling facilities, or landfills. The City of Redmond aims to decrease the single-family total waste stream to no more than 56 lbs/week/household. As total waste produced by households goes down, it is an indication that our community is consuming fewer materials, which results in less natural resource extraction and extends the life of the regional landfill. This metric supports Strategy 7 of the USP and Strategy M2 of the ESAP.

Recommendation

Continue to provide waste reduction outreach to the community with the expectation of maintaining and/or improving this trend.

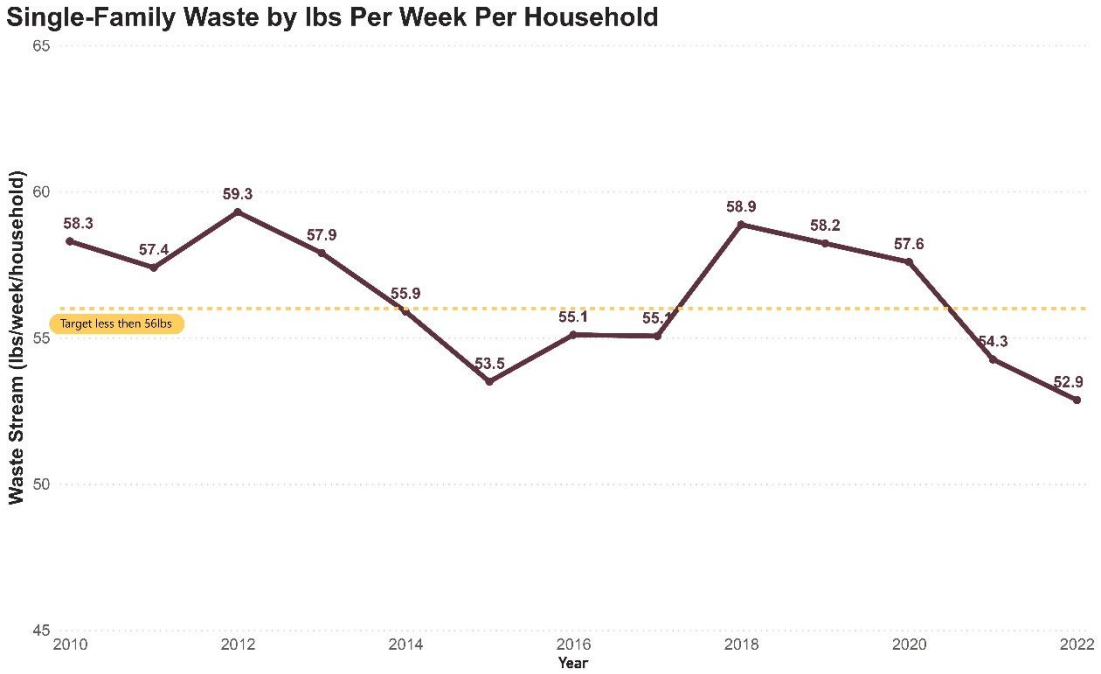


FIGURE 36: SINGLE-FAMILY HOUSEHOLD TOTAL WASTE STREAM

Discussion

Total waste generation among single-family households decreased from 2020 to 2021, below the target of 56 lbs/week/household (Figure 37). Since 2010, this metric has fluctuated around the goal of 56 lbs/week/household. This measure tends to fluctuate in line with the regional economy, as residents spend more, they create more waste.

Commercial Waste Stream

Description

The Commercial Waste Stream includes all waste generated by the commercial sector, which is collected and transported to composting facilities, recycling facilities, or landfills. Not all recyclable materials from businesses are reported to the City, thereby underrepresenting the actual waste stream tonnage. As total waste produced by businesses goes down, it is an indication that our community is consuming fewer materials, which results in less natural resource extraction and extends the life of the regional landfill. This metric supports the ESAP's Strategies M1 and M4 in the Material Management and Waste section.

Recommendation

Maintain commercial outreach and technical assistance programs to keep this trend in a positive direction. As employees return to the physical office, it is expected that waste per employee will increase. Supporting the King County Solid Waste Division RE+ programs, for example, encouraging reusable service ware, could reduce the amount of total waste at food service establishments.

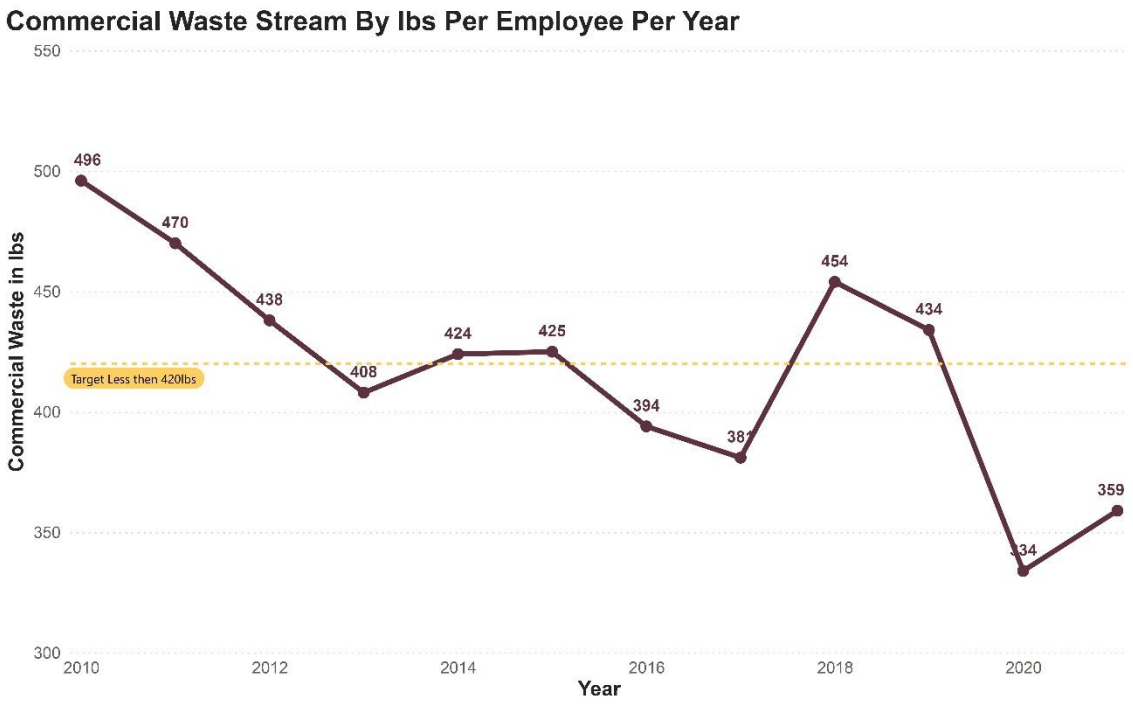


FIGURE 37: COMMERCIAL WASTE STREAM

Discussion

Since 2015, there has been a general decline in the amount of commercial waste stream per employee (Figure 38). From 2019 to 2020, there was a drop of 100 lbs/employee, most likely due to business closures during the pandemic. Meanwhile, in-person commercial outreach and technical assistance increased in 2022 with the expiration of COVID restrictions.

Commercial Organics Waste Stream

0000006

Description

The Commercial Organics Waste Stream is comprised primarily of food waste, including all produce, as well as meat, dairy, bones, and compostable service ware (utensils, cups, plates, etc.). Organics are hauled to a local commercial composter, where they are turned into soil in eight weeks, which is used in local landscaping. Diverting organics from the landfill is an integral part of reducing methane, a potent greenhouse gas.

Recommendation

Look for opportunities to add accounts to this program, especially as restaurants return to full capacity. State mandates on compost service for commercial businesses will begin in 2026, which will drive tonnage higher. The City needs to plan ahead for the impacts of this mandate on our programs and services.

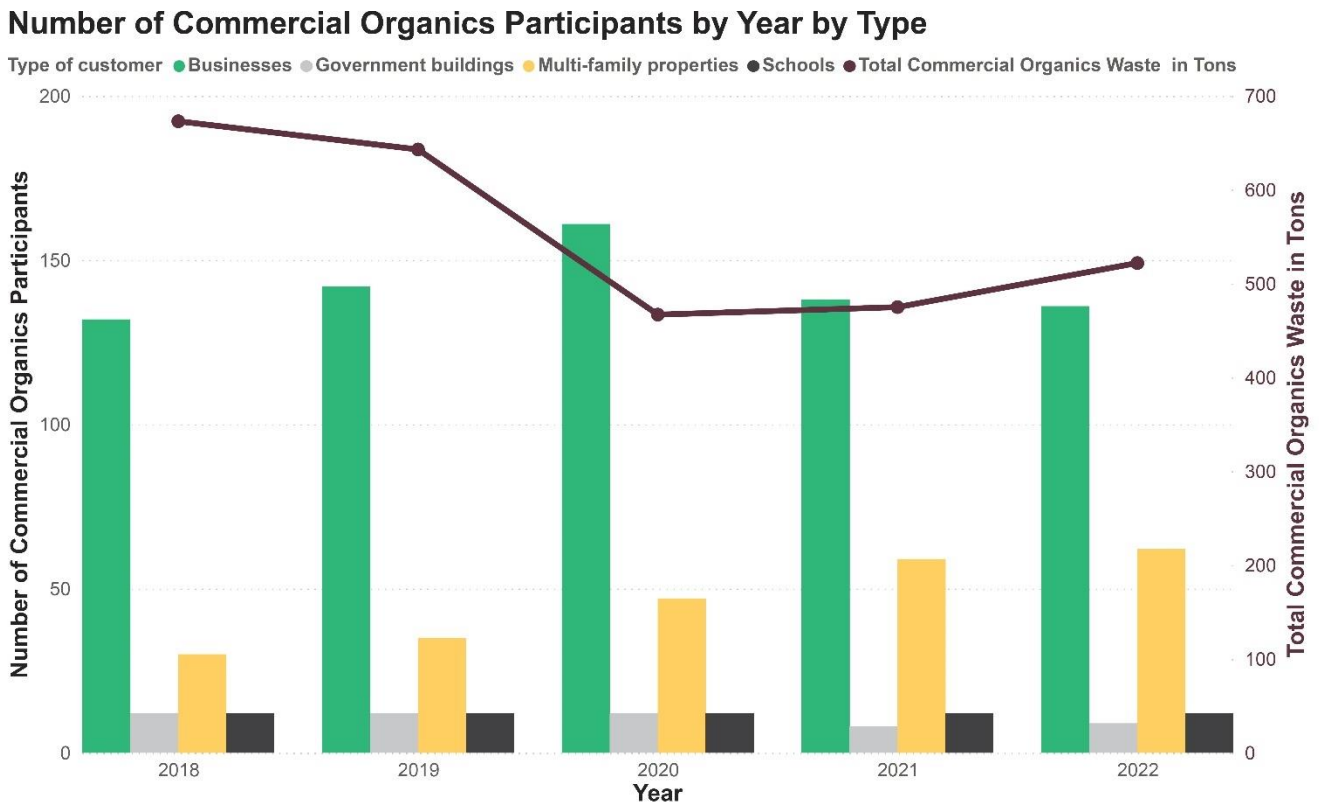


FIGURE 38: TOTAL COMMERCIAL ORGANICS WASTE BY PARTICIPANTS AND TONS

Discussion

In 2020, the number of organics route participants decreased due to restaurant, school, and business closures during the pandemic. However, the addition of more multi-family properties in 2021 and 2022 translated to a total tonnage increase from 2020 (Figure 39). This increase bodes well for the future of the route, especially as schools resume in-person, and more restaurants and businesses re-open. The City's consultant is actively working to "reboot" the route by reaching out to participants who temporarily closed during the pandemic and new multi-family properties.

VI. Appendix

Performance measure methodologies

1. Water Quality Index

Methodology

Methods are currently being revised.

2. Surface Water Biology (B-IBI)

Methodology

The B-IBI score is a quantitative method for determining and comparing the biological condition of streams. These B-IBI scores come from in-stream "kick net samples" that collect benthic organisms from the stream bed. Reach-wide sampling, a Puget Sound Stream Benthos protocol, has been used since 2017; prior to 2017, the City used a targeted riffle-only method. In 2022, the City used internal staff to sample 8 of the 12 sites and contracted out the remaining four sites to a sampling consultant. By 2024 all sampling will be complete internally.

Samples are sent to a laboratory for analysis. Results provide an overall B-IBI score for each stream sampled. The annual B-IBI stream scores are averaged for all streams within a Watershed Management Strategy.

In 2021, the City moved to the standard scoring system, 1-100 B-IBI, with a target score of 60, the level needed to support healthy salmon populations. All prior scores have been adjusted to the new scoring system. The City has sampled over 20 different streams and many different sites on those streams in the past 18 years and only reports on core sites each year. From 2016 to 2022, the 12 core sites have not changed.

3. Runoff Treatment

Methodology

This measure calculates the area that is served by stormwater facilities that provide water quality treatment to current standards (adequate treatment) each year. As new treatment facilities are completed in Redmond, they are added to Redmond's enterprise GIS database. SDA staff check the GIS database on a quarterly basis. When new facilities are identified, the drainage area treated is delineated using Redmond's GIS stormwater network and elevation data to estimate the amount of area treated. Delineated areas are summed to determine the treatment area estimate for the year.

4. Stream Buffer Plantings

Methodology

Public Works and Parks staff, volunteers, and private entities design and execute stream buffer planting projects throughout Redmond. Many of these efforts involve planning and coordination with Redmond EUSD staff. As projects are completed, planting site acreage is estimated using GIS. The number of plants planted is recorded via field notes.

5. Tree Canopy

Methodology

Tree canopy in the City of Redmond has been analyzed every other year since 2009 (excluding 2011). Infrared aerial imagery is purchased from the United States Department of Agriculture and is analyzed using GIS image analyst tools. The GIS image analysis uses the "ISO Cluster Unsupervised Classification" method. This process automates land-use classification based on the color of aerial photography pixels. The result is a GIS polygon feature class that estimates all tree canopy in the City of Redmond for a given year.

Further analysis of tree canopy is conducted in Redmond's critical area stream buffers. After a Tree Canopy layer is created, it is overlaid with the critical area stream buffers to calculate the percentage of tree canopy within the buffers. The buffers are created according to Redmond Municipal Code 21.64.020.B:

- Class 1 – 150 to 200 ft (see municipal code link for details)
- Class 2 – 150 ft
- Class 3 – 100 ft
- Class 4 – 36 ft

Tree Canopy coverage was last calculated in 2019. The methodology is being revaluated for future reporting.

6. Fish Migration Barriers and Accessible Stream Length

Methodology

Fish barriers are inventoried and assessed for fish passage using Washington Department of Fish and Wildlife (WDFW) protocols. When a fish barrier is identified for removal, EUSD staff coordinate the removal with Redmond staff or contractors. As removal projects are completed, EUSD staff update their custom fish barrier Access database to note the barrier's fixed date. To calculate the length of Class 2 stream accessibility by year, the database barrier points, and Redmond's Stream GIS layer are analyzed via a GIS model.

7. In-stream Habitat Complexity

Methodology

Baseline data are gathered for stream reaches through reconnaissance by City staff. During these reconnaissance projects, staff walk streams and count the number of LWD. LWD counted must have a minimum diameter of ten centimeters and a length of two meters. Stream length is measured using Redmond's enterprise GIS stream layer. In-stream complexity classification is calculated by dividing the number of LWD per 100 feet of stream. LWD/100 feet complexity classifications are listed below.

- >12 – High
- 8.1-12 – Good
- 4.1-8 – Moderate

- 1.1-4 – Fair
- 0-1 - Poor

8. Water System Compliance

Methodology

The Public Works Maintenance and Operations Water Quality Division collects samples according to the Water Quality Monitoring Schedule set by the Washington State Department of Health (DOH), and results are directly reported to DOH from the laboratory.

Redmond is required to collect 100 regulatory bacteriological samples for laboratory analysis for total coliform bacteria. While total coliform bacteria are ubiquitous in the environment, not all are harmful to human health. Analyses of these bacteria are used as an indicator of a potential issue in the distribution system or insufficient disinfection. Per the requirements of the Revised Total Coliform Rule, any sample positive for total coliform requires repeat samples at the original site along with an upstream and downstream sample within five service line connections of the original sample site.

9. Percentage of monitoring wells meeting Groundwater quality standards

Methodology

Groundwater sample results are compared to the Washington State Department of Ecology Groundwater Quality Criteria (WAC 173-200) and Department of Health Drinking Water maximum contaminant levels (MCLs) (WAC 246-290-310). Sampling is performed as part of planning for proposed regulations and will be included in the calculation of this measure's results after enforceable regulations become effective.

10. Percent of groundwater monitoring wells meeting primary Drinking Water standards

Methodology

Samples of groundwater are removed from the ground at strategic locations near and around drinking water wells using resource protection monitoring wells that were installed for that purpose. Sample results are compared to the Washington State Department of Health Drinking Water MCLs (WAC 246-290-310). Sampling is performed as part of planning for proposed regulations and will be included in the calculation of this measure's results after enforceable regulations become effective.

11. Percentage of high-risk sites visited, and technical assistance provided

Methodology

Commercial and industrial businesses and activities with the potential to cause groundwater, stormwater, or surface water pollution are identified, evaluated, and assigned a pollution risk ranking during routine reoccurring inspections. Sites evaluated as having a high pollution risk due to their operations and/or recurring compliance issues after three or more consecutive visits are inspected

annually and provided with technical assistance to implement pollution prevention best management practices to lower their potential pollution risk.

12. High Priority Septic Removal

Methodology

Septic systems are tracked by Redmond Public Works staff using a parcel-based GIS layer. If a parcel is known to have a septic system, the parcel area is recorded. Redmond staff track the removal of septic systems by reviewing demolition permits stored in Redmond's EnerGov database. Once a septic demolition is completed, the corresponding septic parcel is set to "Demolition Complete," and the date of completion is recorded. If a parcel in the "Septic Parcel" layer intersects Redmond's CARA or is within 100 feet of a natural waterway, it is considered "High Priority." To determine which parcels are High Priority, GIS analysis is conducted using the Septic Parcel, Stream (stream classes 1-4), and Waterbody (Pond where pond type is natural and Lake Edge Carto) layers as stored in Redmond's GIS database.

13. City Well Production versus Cascade Water Alliance (CWA) Supply

Methodology

Well-production data is produced with weekly production meter reads, which are reported to CWA monthly. Consumption data (water sales) is extracted from utility billing software and provided monthly by the Utility Billing Division of the Finance Department. Both sets of data are compared to determine the ratio of water from City wells to CWA supply.

14. Water Main Breaks

Methodology

To calculate the number of breaks per 100 miles of pipe. Redmond's LuCity and GIS databases are used to provide the necessary data. When Redmond staff respond to fix main breaks and major leaks, they create a work order in Redmond's LuCity application. When logging the work orders, the problem related to the work order is assigned the category of "Main Break/Major Leak." These records are queried to get the count of main breaks. These results are then divided by water pipe miles (per 100 miles) obtained from Redmond's enterprise GIS database to produce the results.

15. Wastewater CCTV Inspections

Methodology

This program tracks sewer pipe conditions with the use of a CCTV video robot. With this robot, technicians can catalog and document pipe deficiencies according to the Pipeline Assessment Certification Program (PACP) evaluation standards. All videos and documented deficiencies are recorded using the Granite Net software system and stored within the City's enterprise database.

To estimate the length of pipes inspected, the Granite Net database is queried to identify all surveyed pipe length for the year. This data is then summed to get the total length of pipe inspected for the

year (all surveyed length is summed, including duplicate inspections). Redmond GIS is then queried to estimate the number of wastewater pipes available for inspection. To be considered eligible for inspections, a pipe must meet the following criteria: must be owned by Redmond or have joint ownership with Redmond, must have a status of Active, must be a Gravity Main, and must have a diameter between 8-36 inches.

16. Sanitary Sewer Overflows

Methodology

Using a CCTV truck to visually inspect pipes can help identify potential sources of SSO. When blockages are discovered, a Jetter or Vactor truck is used to clean and remove debris, eliminating the SSO source. In addition to CCTV, the department conducts manhole inspections throughout the year, with an inspection goal of 20% (1,560) of the systems structures inspected annually. These inspections provide the department with an additional source of SSO identification.

Our second source of SSO potential is from our 22 lift stations. In order to ensure lift stations are operational, the department has two Utility System Technicians dedicated to monitoring and preventative maintenance activities at all lift station sites. This team ensures lift stations have 24/7 monitoring and system redundancy.

All SSOs are recorded using the Lucity software program. SSO incidents can be queried in the system and reported on for the year.

17. Runoff Flow Control

Methodology

To estimate the amount of area in Redmond with adequate flow control, stormwater pipe install years are assigned to stormwater drainage areas. Using the criteria below, drainage areas are then assigned an estimate of adequate flow control based on the drainage area's install year:

- 2006 and greater = 100%
- 2002-2005 = 50%
- 1999-2001 = 25%
- 1993-1998 = 5%
- Before 1993 = 0%

It is important to note that this is an estimate based on currently available Redmond GIS data. Due to possible lags in Record Drawing filings and scans, and GIS production, some information may not yet be available. It is also important to note that these lags can vary by year depending on current workloads and priorities.

18. Stormwater NPDES Catch Basin Inspections

Methodology

The catch basin inspections are performed in the field. Data is collected on tablets and stored in the Lucity asset management program. If the inspection sediment depth measurement is over 60% of the structure's catch, it is put on a list to be cleaned within six months of inspection. If the structure is found to be in need of repair during the inspection, it is added to the repair list and must be repaired within six months of inspection.

19. Solid Waste and Recycling QAlert Response Time

Methodology

The QAlert system is able to track the time before the first response to a request. The staff respond to requests only respond during business hours, as this is not a monitored hotline. Setting a base response rate of first action within 48 hours accommodates requests that come in Fridays after business hours. No goal for percent of responses within 48 hours has been established, as this is a new performance metric this year. Data for this request is pulled directly from the QAlert system for the requests under the three solid waste categories.

20. Waste Management Regional Customer Service Response

Methodology

Data for this metric is reported to the City on a monthly basis by the contracted hauler on their Enspire online database system. Staff logs in to pull up the data and record it in our files before taking action on performance fee assessments.

21. Increase Community Waste Diversion

Methodology

WM provides the tonnage data, which is extracted from their route and customer database. To calculate the overall diversion rate, the single-family, multifamily, and commercial recycling, and compost are divided by the total waste. The diversion rate by sector is also calculated separately for each sector.

22. Single Family Household Total Waste Stream

Methodology

WM trucks pick up waste from single-family homes on a regular basis and drop off the waste at designated facilities. The trucks are weighed upon arrival at designated facilities prior to waste drop off, then the weight is recorded in WM's Redmond customer route database. This database also provides the number of single-family accounts, which is used with the weight data to calculate the tons/week/household.

23. Commercial Waste Stream

Methodology

WM trucks pick up commercial waste on a regular basis and drop off the waste at designated facilities. The trucks are weighed upon arrival at designated facilities prior to waste drop off, then the weight is recorded in Redmond's waste management hauler customer route database. Total garbage tonnage from the commercial sector is obtained from WM, and employee population estimates are obtained annually from the Puget Sound Regional Council. The commercial garbage rate is calculated to measure and compare to the target goal of a maximum of 420 pounds per year per employee. Currently, only data up to 2021 are available as the employee population for 2022 is not available from the Puget Sound Regional Council.

24. Commercial Organics Waste Stream

Methodology

Redmond's commercial organics route participants include restaurants, schools, government buildings, apartment and condo complexes, and other businesses. Redmond manages a consultant who engages with participants to set up and maintain organics service. Participants receive special training to ensure that contamination in the organics waste stream is limited. The City's contracted hauler picks up organics from route participants and transports the organics to a commercial composting facility where it is weighed. Actual monthly organics tonnage is provided to the City's consultant, and this tonnage is used to calculate annual commercial organics diversion.

The City of Redmond assures that no person shall, on the grounds of race, color, national origin, or gender, as provided by Title VI of the Civil Rights Act of 1964 and the Civil Rights Restoration Act of 1987, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity. For more information about Title VI, please visit redmond.gov/TitleVI.

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